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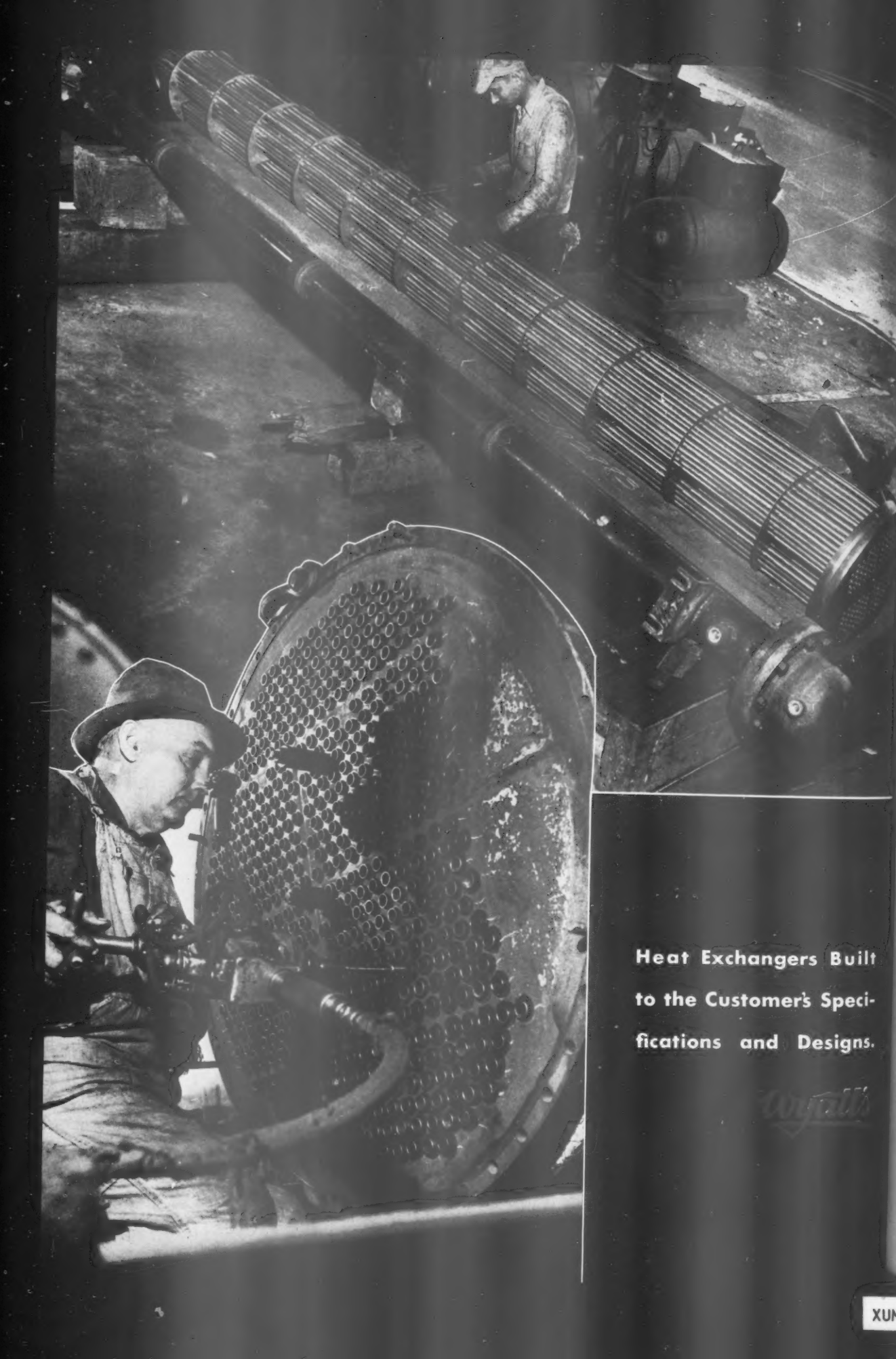

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MEET

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the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 118

CRUDE-OIL STOCKS 220,515,000 bbl. as of Nov. 17—up 516,000 bbl. One year ago 221,431,000 bbl.

GASOLINE STOCKS 80,954,000 bbl. as of Nov. 17—up 2,766,000 bbl. One year ago 78,660,000 bbl.

RESIDUAL FUEL-OIL STOCKS 45,608,000 bbl. as of Nov. 17—down 328,000 bbl. One year ago 63,465,000 bbl.

GAS OIL AND DISTILLATE STOCKS 45,341,000 bbl. as of Nov. 17—up 215,000 bbl. One year ago 47,209,000 bbl.

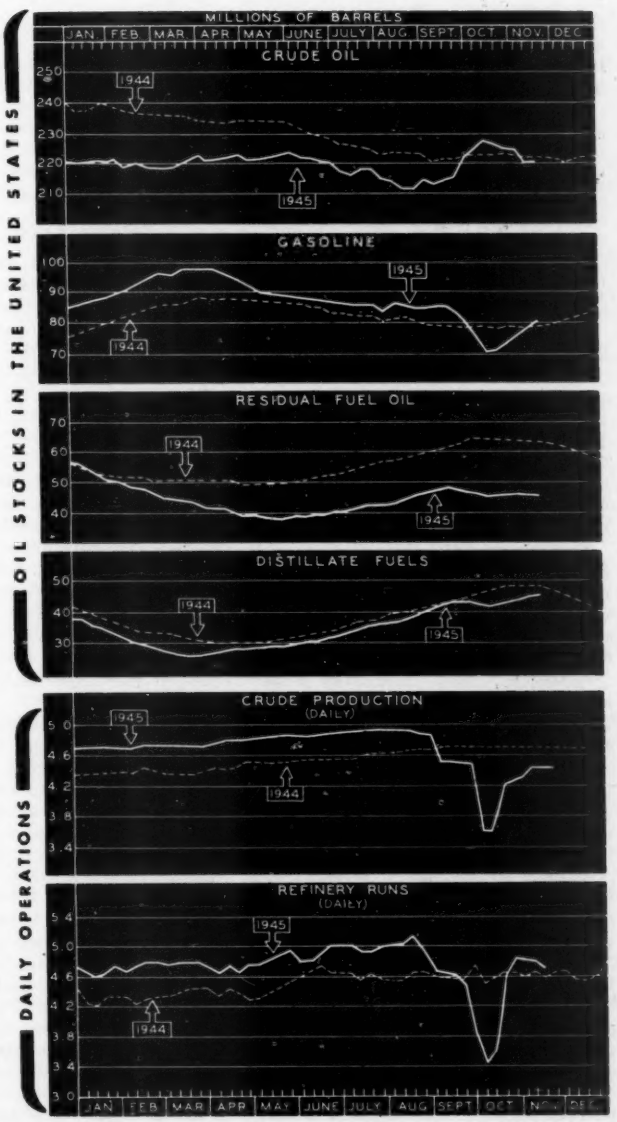
CRUDE-OIL PRODUCTION 4,470,500 bbl. as of Nov. 24—up 3,000 bbl. One year ago 4,734,000 bbl.

REFINERY RUNS 4,693,000 bbl. daily week ended Nov. 17—down 96,000 bbl. One year ago 4,598,000 bbl.

DEMANDS of consumers are bringing about a somewhat confusing situation in refining and marketing operations. It has to do with the unexpectedly heavy consumption of premium-grade Ethyl gasoline. It is estimated that the demand is at least 35 per cent of the total motor fuel requirements. In some consuming centers premium sales have been as high as 75 per cent. The percentage distribution of this grade has always paralleled the country's business conditions. Demands increased steadily during the late twenties, but declined sharply during the depression period of the early thirties when sales declined to 10 per cent or less in most areas. Many companies considered dropping its distribution because it had ceased to be profitable to them and to their jobbers and dealers. At the same time there were large increases in the sale of third-grade motor fuel, inferior in quality and lower in price in relation to the regular and premium grades.

DURING the war and since its close the premium grade has greatly increased in popularity. Observers agree that this trend, which has witnessed the passing of the third grade, is entirely a reflection of prosperous conditions. So far as motor performance is concerned there should be no greater demand for the superior grades of motor fuel than there was before the war.

THERE have been repercussions in refinery operations. Refiners who operate with crude oil, whose straight-run gasolines are low in octane rating, and who do not have sufficient cracking capacity are having difficulty in supplying the premium requirements of their customers. Other refiners, who have large catalytic cracking units, occupy a particularly strong competitive position. In these plants this enlarged demand for premium motor fuels has partially offset the loss in demand for high-octane blending material which came about when military requirements dropped to a small percentage of the war shipments. The premium motor fuel situation has also emphasized the controversy over the best method of making octane ratings, involving road tests and the A.S.T.M. and research testing methods. Though some phases of recent developments are undoubtedly temporary, there are others which will have lasting reflection in refinery and market operations of the future.



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FPC Hears Widely Divergent Views in Gas Investigation

NEW ORLEANS.—Completing its New Orleans hearing in a general investigation of the natural-gas industry, Federal Power Commission must weigh sharply divergent views concerning the question of whether Louisiana and other states should export natural gas or conserve it for their own use.

Louisiana's official witnesses took the position that gas-producing states now largely agricultural must industrialize or face an economic plight; that the only fuel available to industry in Louisiana is natural gas, which also is gaining importance as a raw material for manufacture of synthetics; that virtually all of Louisiana's gas reserves are known and will be depleted within 30 years.

Louisiana's spokesmen asked the commission to support efforts for conserving the gas supply which they expected to create for themselves through state regulatory bodies. They urged the commission to grant no more permits for pipe lines to take natural gas out of Louisiana without considering two factors:

One, the presence in the areas to be served of other fuels or sources of power, such as coal or hydroelectric developments; the other, the use proposed for the natural gas. The Louisiana representatives asserted that such uses as heating the boilers of steam engines were "inferior" and that other fuels should be employed.

Opposing witnesses contended that there was reason to believe increasing reservoirs of natural gas would be uncovered, especially as wells were drilled deeper, and that it was impractical now to set an exhaustion date. Moreover, they argued, by the time natural gas is depleted, some other source of energy may have made it obsolete.

It is unfair to the industry and to owners of lands and royalties, these witnesses declared, to deny them returns on their properties and investments for the benefit of a possible industrial development which depends on many more factors than the presence of natural gas.

They argued also that an extension of FPC jurisdiction, whether by reinterpretation of its powers or additional legislation, would give it control over the production as well as the interstate distribution of gas and infringe on the conservation powers of the state. Louisiana said these results were not necessary and not contemplated.

Finally, the opposition declared, interference with free movement of a commodity within the United States was an unwarranted disruption of interstate trade that might depress prices, create monopolies and provoke retaliation from other states with other commodities to provide.

Dr. John Huner, state geologist, one of the last witnesses representing Louisiana, admitted under questioning that the state's oil reserves will be depleted before the gas reserves, if estimates of known reserves are correct and assuming current withdrawals. He discussed the cycling program which the state is planning and said that in those fields where cycling is undertaken the gas will not be available for marketing for 15 years, and that the state may compel cycling in some fields if it is not done voluntarily.

Earhart Fears Depletion

Fred A. Earhart, commissioner of public utilities in New Orleans, expressed the fear that depletion of gas resources in Louisiana would cause the city to go back to artificial gas made from coal, and urged the commission, in considering the whole question, to make the gas resources of the nation available to the greatest use for the greatest number in the country.

A statement from Gov. Ben Laney, of Arkansas, pointed out that Arkansas is considered a consumer state although it produces a substantial volume of gas. For several years, the statement said, it has been Arkansas' policy to control and regulate rigidly the natural gas produced and consumed within the state, and the state has prevented waste of this natural resource.

"I believe," said the governor, "that a great majority of our people are unalterably opposed to any additional regulation or control by the federal Government over the oil and gas industries in our state. Any 'dual control' by the several states and the federal Government will lead to conflict and confusion."

"State regulation in Arkansas," declared O. C. Bailey, chairman of Arkansas Oil and Gas Commission, "is geared to scientific investigation with the most modern and best proved principles applied to the facts in each individual case. Our commission and the witnesses appearing before us are thoroughly familiar with our fields, our reservoirs, our practices, and our needs. Our legal structure is adequate, and our political climate is favorable to scientific results. It is our conviction that state regulation under these circumstances is more effective than federal regulation could be, and that it is more acceptable to our people. By this means we preserve the principle of state rights; we accomplish the conservation of our natural resources, and we eliminate a duplication of effort and the burden of excessive regimentation. All of these things make for general acceptance of sound regulation and are in keeping with the principle of free enterprise, free competition and progressive improvement in the economic status of our people.

"Believing that consideration of end use by any authority controlling the disposition of gas has only a tendency to depress the price at the well, we advocate the elimination of that consideration, substituting those state measures of control of production and gathering that fit into the economic trends making for the higher price under free competition and enterprise, unhampered by excessive regimentation and assisted only by such local control as is necessary. We believe our program is effective."

W. C. Spooner, consulting geologist, appearing as a witness for the natural-gas industry, declared himself opposed to the attitude of Louisiana's conservation committee. "I feel, he said, "that the surplus of gas of Louisiana—and there is much of it—some of which has been wasted, should be sold to our neighbors across the line in the same free American way that we buy their coal, their farm implements, their oleomargarine, cheese, butter, and Kentucky whiskey, and that the authority of your honorable commission should be exercised with caution, so as not to destroy interstate commerce and the natural comity of relationships between the states which form a solid American combination of units, known as the United States."

Oil-Tax Collections in Mississippi Going Up

JACKSON. — Gasoline and oil taxes in Mississippi for the collection month of November totaled $1,188,187, Frank F. Mize, state commissioner of motor vehicles, reported. This is $91,451 more than was collected during the corresponding period last year.

The collections ran the total for the 11 collection months of 1945 to $12,148,513, which is $1,290,788 more than the collections during the first 11 months of 1944.

30-Company Analysis Compares War and Prewar Conditions

"FINANCIAL Analysis of 30 Oil Companies," a pamphlet prepared by Joseph E. Pogue and Frederick G. Coqueron, of the Chase National Bank, New York, presents timely information on operations of the petroleum industry during the prewar and war periods, by comparing 30 companies which during 1944 produced 60.7 per cent of the total domestic output of crude oil and refined 80.7 per cent of the crude run to stills.

The authors lend strength to the contention that the industry has been depleting its crude-oil reserves at less than replacement costs, by showing that the cost of replacing a barrel of developed reserve has risen from 26.9 cents per barrel in 1937 to 62.5 cents in 1944. In the prewar years 1937-40, the average was 32.5 cents per barrel, compared with 52.1 cents in the period 1941-44. Moreover, the trend was rising.

Verification of this trend is given indirectly in data showing capital expenditures in production facilities per barrel of production. Since the prewar status of the industry was one with a large shut-in producing capacity, which was released to meet the demands of war, the normal course would be for capital expenditures in the war period to drop sharply in terms of the per-barrel unit. Instead the data show that the capital expenditure for production facilities was 56 cents per barrel prewar and 55 cents during the war. The 56-cent figure represents an under-capacity production, and is therefore high in terms of potential production. The 55-cent figure represents capacity production, a large part of which came from wells previously underproduced, and which therefore called for little new investment. The inference is clear that new production cost much more per barrel than old production.

Additional proof of this is given in the estimated cost of drilling. The prewar cost averaged about $30,000 per well, compared with $43,100 in wartime. This increase of about 44 per cent is only partly accounted for by the greater average depths drilled and the growing proportion of wildcat wells. A substantial part must have been due to general increases in drilling costs, a trend which is troubling the whole industry. These 30 companies drilled about 1,500 wildcat tests in 1944, nearly 50 per cent of the total.

There is ample evidence that the 30 companies did not shirk from their responsibility in supplying oil for the war, even at less than replacement costs. In the prewar period they provided an average of 52.5 per cent of the domestic production. During the war this rose to 56.1 per cent and in 1944 to 60.7 per cent, indicating they were assuming a steadily increasing share of the burden.

Conditions in refining and transportation are somewhat obscured by investments in such war items as aviation-gasoline plants, synthetic-rubber plants, war-emergency pipe lines, tankers, tankcar loading and unloading facilities, etc.

However, in terms of crude refined, the smaller companies increased their competitive position slightly. During the prewar period the 30 companies refined 81 per cent of the crude; during the war they averaged 80.1 per cent, and even in 1944, when many of the large aviation gasoline plants were completed, these large companies refined only 80.7 per cent of the crude, still slightly below their prewar average.

Phillips Obtains Option On Shamrock Stock

NEW YORK.—An option on 422,183 shares of Shamrock Oil & Gas Corp. stock has been granted to K. S. Adams, president Phillips Petroleum Co., Bartlesville, Okla. If negotiations are consummated, Phillips will acquire control of Shamrock, which is a substantial operator in the Panhandle of Texas with crude-oil production and natural-gasoline facilities which would tie in with the purchaser's properties.

Adam's option calls for payment at $13.75 a share and the negotiations are predicated on assurance that he will buy up to 70 per cent of all shares offered up to December 7. Shamrock has 1,345,570 outstanding shares, meaning that Adams and Phillips are committed to take up to 941,899 shares if stockholders offer their holdings to that extent.

H. C. Fownes II is president of Shamrock, and J. H. Dunn, Amarillo, is vice president and general manager. The company's natural-gasoline plant at Sunray, Moore County, Texas, has a rated daily capacity of 130,000 gal. daily.

The purchase price applied to shares optioned indicates a total valuation on Shamrock of more than $18,000,000.

Leases on Tidal Lands in Matagorda Bay Restored

AUSTIN.—Oil and gas leases on 49,427 acres of submerged land in Matagorda Bay, suspended on account of the war, were reinstated last week by the State School Land Board, following action by the federal Government in removing restrictions on drilling.

Land Commissioner Bascom Giles, a member of the board, said the leases upon which suspensions were released belong to A. W. Cherry, Pure Oil Co., Fidelity Oil & Royalty Co., J. L. Collins, Sinclair Prairie Oil Co., Amerada Petroleum Corp., Stanolind Oil & Gas Co., Humble Oil & Refining Co., Tide Water Associated Oil Co., Salt Dome Oil Co., Atlantic Refining Co., The Texas Co., and W. G. Goldston.

Several oil and gas fields exist in the Matagorda Bay area. Offshore drilling was just beginning when the war started.

Fact-Finding Board May Study Refinery Dispute

WASHINGTON. — Secretary of Labor Lewis B. Schwellenbach hopes to settle through a fact-finding commission the labor dispute which caused government seizure of 53 refineries last October 6. The labor-management conference has not formally approved the plan, but the Government, it is said, will try it out anyway. The fact-finding commission would be composed of Dr. Frank P. Graham, president of University of North Carolina; Otto Beyer, labor relations adviser for TVA and other federal agencies, and Paul De Liel, professor of industrial relations at Stanford University.

Ceiling Prices for Crude Raised in 21 Pools

WASHINGTON.—Increases ranging from 2 to 35 cents a barrel have been granted in ceiling prices for crude oil in 21 pools by Office of Price Administration under the stripper - well premium - payment plan. The pools, with the amount of each increase in cents per barrel, follow:

Oklahoma — Atlantic, 20; Barker, 35; Empire, 35; Kendrick, 17; Lovell, 25; March North, 20; Norfolk West, 25; Seminole East, 25; Signal Hill, 20; St. Louis district, 20; St. Louis North, 35; Tuskegee East, 20.

Texas — Hendrick, 25; Iatan-East Howard, 2; Lubbock, 35; Remo (Osborne area), 25; Teci (Osborne area), 25.

California—Mountain View, 2.

Colorado—Ft. Collins, 24.

Kansas—Catherine, 25.

Louisiana—Lake Mongoulois, 24.

XUM

PAW, Its Task Finished, Gives Account of Its Stewardship

WASHINGTON. — Work of Petroleum Administration for War already reduced to a small fraction of its former volume, will be practically halted after presentation of its stewardship account before the Lea subcommittee of the House December 3.

A more elaborate final report was made November 28 before the O'Mahoney committee of the Senate. In this presentation an effort was made by PAW to cast as much light as possible on future trends in the industry. The O'Mahoney committee is chiefly concrened with determining what legislation, if any, is needed to formulate a domestic and foreign oil policy which most adequately will serve the national interest.

Ten division heads of PAW presented reports before the O'Mahoney committee, dealing extensively with every phase of petroleum operations during the war and projecting future trend as far as practical. In addition, there were opening statements by Administrator Harold L. Ickes and Deputy Administrator Ralph K. Davies. A summary by Davies closed the presentation.

With conclusion of the congressional hearings, most of the remaining skeleton force of PAW will return to private industry. Many of the key men had been requested to remain for preparation of the O'Mahoney and Lea committee testimony by Deputy Davies.

Presenting reports were H. Chandler Ide, Howard Page, Philip H. Bohart, W. B. Heroy, A. P. Frame, C. Stribling Snodgrass, James E. Pew, Walter Hechuli, Roy F. Hawkins, and George A. Wilson.

There is abundant evidence, however, in the Interior Department. where PAW has been domiciled throughout the war emergency, that this agency is out of business for all practical purposes and that all moving will be completed in a matter of days.

Dr. John W. Frey, assistant deputy administrator, has been assigned the task of writing a history of PAW's work and achievements. He is receiving reports from all departments and functional committees. These will be summarized and woven into one volume. Dr. Frey will complete this work with a small staff of assistants before the middle of 1946.

Indiana Standard Posts Prices for Wyoming Oil

Standard Oil Co. (Indiana) has made an initial posting of prices which it will pay for Wyoming black crude oil purchased in the Pilot Butte, Winkleman Dome, and Steamboat Butte fields of Fremont County, Starting at 65 cents a barrel for crude of 20° to 20.9° gravity, the prices with 2½-cent differential, go to 90 cents for 30° to 30.9° gravity. The prices are effective as of November 20. The company does not offer to buy crude of gravity lower than 20°.

Restrictions on Purchases Of Oil by Italy Removed

ROME.—Allied policy regarding oil purchases by Italy has been changed so that the country now may buy all of the oil products for which she can pay and for which shipping is available, according to a statement given out by the United States Embassy. Italy heretofore has been allowed only enough oil products to prevent disease and curb unrest.

California Asks More Time In Coastal-Land Suit

WASHINGTON.—Robert W. Kenny, California attorney general, has asked the Supreme Court for a month's additional time in which to file an answer to a suit brought by the United States Government seeking title to offshore oil lands along the California coast.

Kenny filed a motion asking the court to extend the time from December 28 to January 28. He said Christmas holiday printing delays and lack of legal aid might cause a return to be filed which would "prejudice the rights of the state" if an extension of time was not granted.

Head of Oil Group Scores Raids on Road Funds

SPRINGFIELD, Ill. — "The overwhelming majorities piled up in Kentucky and Pennsylvania in favor of constitutional amendments prohibiting use of highway funds for nonhighway purposes should serve as a cue to Illinois in planning its road-system policies," H. L. Robinson, executive secretary of Illinois Petroleum Industries Committee, declared in a statement.

"Gasoline and other automotive taxes were inaugurated to provide funds for highway construction and improvement. We have not adhered to this sound practice. Raids on our highway funds are one of the greatest potential threats to our highway system, in addition to being a gross injustice to motorists who are paying for roads and not getting them."

Nation's Oil Barrel Running Low, Says O'Mahoney

WASHINGTON.—The nation's oil barrel is running low, and the time to start looking for more is now, says Sen. J. C. O'Mahoney, so he and Sen. C. A. Hatch are sponsoring amendments to the Oil-Leasing Act.

"The United States drew heavily upon its reserves of petroleum for war purposes, using more than 1,000,000 bbl. daily in excess of normal production," said O'Mahoney. "Great new deposits of oil have been developed in the Middle East, particularly in Arabia. Estimates of reserves there are in the hundreds of millions of barrels.

"Some American companies have interests and concessions in the Middle East. But if the United States is to continue to be self-sufficient in its resources of energy—the basis of all industrial prosperity—we must not only promote the manufacture of liquid fuels from coal and oil shale, but we must adopt a policy for the exploration of oil and gas upon the public domain that will stimulate search."

Possibilities of Canol Area Explored by Imperial Oil

TORONTO. — Imperial Oil, Ltd., has launched an exploratory project in a vast region adjacent to the Norman Wells field with a view of ascertaining whether the wartime Canol project can be turned into a profitable business enterprise.

A company spokesman said an area of 2,000,000 acres is being explored under a permit from the Canadian Government. Fourteen test holes have been drilled without success.

The Canol project was developed at a cost of $134,000,000. If not taken over by the Canadian Government, it is to be offered in open market.

Reserves in some 60 wells operated during the war in the Norman Wells field, about 1,600 miles north of Edmonton, are not enough to classify the enterprise as "commercially profitable," the company official said. He estimated the reserve at 30,000,000 bbl.

THIS WEEK

INNOVATIONS—Pelletizing a refining catalyst achieved by Indiana Standard through adaption of "shot tower" principle, employed for centuries in making shot for guns. . . . Catalyst solution sprayed experimentally into top of elevator shaft recovered at bottom in form of microscopic spherical particles. . . . Special tower may be built for production on commercial scale. . . . ¶Use of additives to improve lubricating oils will create $100,000,000 annual market within 5 years, Socony-Vacuum research director predicts. . . . For example new motor oils will enable automobile engines to run smoothly in extreme heat or cold. . . . ¶To increase efficiency of home oil burners and fuels Socony-Vacuum establishes new test laboratory. . . .

NATURAL GAS—FPC regional hearing in New Orleans closes, with widely divergent views to be studied. . . . Louisiana's official representatives urge conservation for home use. . . . Say state's known reserves will be depleted in 30 years. . . . State, now largely agricultural, must industrialize or face economic plight. . . . May have to resort to artificial gas. . . . ¶Opposing witnesses contend that new fields will be uncovered, some by deeper drilling. . . . "Surplus gas should be sold to neighbors across the line in same way we buy their coal, cheese, and Kentucky whiskey." . . . Anyway, "new sources of energy likely to make natural gas obsolete before reserves are depleted." . . .

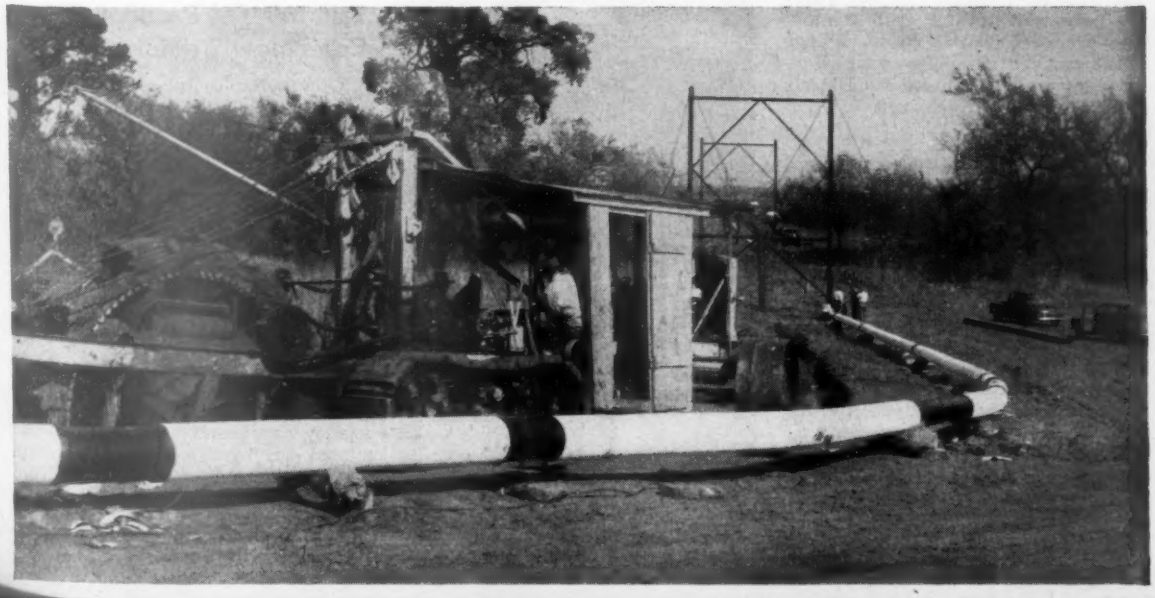
PRODUCTION—Nation's crude output goes higher for sixth successive week. . . . Daily average 4,470,500 bbl., up 3,000. . . . Major change in California, where production jumped 12,700 bbl. . . . Kansas dropped 7,100 bbl.. Oklahoma 5,100. . . . ¶Week's completions 531, off 47 from preceding week. . . . Wildcat completions 100, up 29. . . . ¶Imperial Oil starts exploratory work in vast region adjacent to Norman Wells field to determine whether Canol project can be turned into profitable enterprise. . . . ¶Argentina's crude output off 6 per cent from last year's. . . .

LABOR—Secretary Schwellenbach plans three-man fact-finding board to study dispute which caused seizure by Navy of 53 strike-bound refineries. . . . Would formulate proposals for settlement and submit to both sides. . . . C.I.O. officials appeal to Truman to release plants from government control. . . . Navy, with personnel gradually reduced by discharges, anxious to drop job of overseeing refinery operations. . . . ¶Provisional revolutionary junta in Venezuela gives every oil worker wage raise of 70 cents a day. . . . ¶Union employes at Pan American's Texas City refinery vote rejection of company's offer of 15 per cent increase. . . . Demand 30 per cent. . . .

PAW—Folding up after giving account of its stewardship. . . . Skeleton force that remained now returning to private interests. . . . Dr. Frey, assistant deputy administrator, assigned to write history and achievements of this agency. . . .

INTERNATIONAL—"Preponderance of sentiment" favors ratification of Anglo-American oil pact, says Russell Brown. . . . Opposition based chiefly on misinterpretation of wording. . . . Senate foreign committee to hear any viewpoints early next year. . . . ¶Japanese Government receives permission to import petroleum and other commodities, clearing way for revival of foreign trade.

Laying of a 12-in. lateral line for high-pressure operation at 1,000 psi. for Oklahoma Natural Gas Co. to replace another line. Construction has been contracted by H. C. Price Co. To meet the demands for the growing markets the natural-gas companies of the United States are now making plans for extensive construction in 1946 which will include much looping of existing trunk lines as well as large new systems which together have been estimated to total more than 3,000 miles



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INTERNATIONAL

Colombia's Oil Bill Under Discussion by Committee

BOGOTA.—The 33 members of the House oil committee are studying the oil bill and the amendments introduced by J. J. Turbay, chairman. Oil Minister Camacho is attending the meetings. It was decided that each article and proposed modification should be discussed and voted upon separately. As a result of this procedure, when the bill is submitted to the House for a second reading and vote, that body, according to regulations in force, may not make further amendments, but only approve or reject its provisions as they stand.

Camacho urged upon the committee the necessity of a strong oil statute, to promote development of an important national industry. The "single lessor" plan, under which only the Government would lease oil lands, had commendable features, he said, but he doubted its constitutionality, a question which the Supreme Court would have to decide. He alluded to the British-American oil pact and the need of framing Colombia's oil statute in the light of that international agreement, so that this country may not remain merely a potential oil reserve, but obtain the benefits of active development.

Crude Output in Argentina Shows 5.9 Per Cent Drop

BUENOS AIRES.—Crude-oil production in Argentina during the first quarter of the current year totaled 933,301 cu. m., or 5.9 per cent less than the output in the comparable period of 1944. Private companies produced 306,332 cu. m., a drop of 4.8 per cent from last year. Government wells produced 626,969 cu. m., a decline of 6.5 per cent.

Oil Workers of Venezuela Get General Raise in Pay

CARACAS.—Every oil worker in Venezuela received an increase of 2 bolivars (about 70 cents) in his daily wages last week upon order of the labor ministry and the provisional revolutionary junta. The raise, effective immediately, applies to labor engaged in exploration work, also to port workers employed by oil companies or by persons serving as intermediaries or contractors for oil companies.

Originally the raise was ordered November 1944 by the government of deposed President Isaias Medina, but it had not been made effective for some workers. Last week's order is intended to make it applicable to every worker without exception.

New Venezuela Minister Long in Public Life

CARACAS.—Dr. Juan P. Perez Alfonzo, minister of development in Venezuela's new transitional government, has been an active figure in the country's economic and political life. Born in Caracas 42 years ago, he went to the United States at 19 and attended Peddie School, Hightown, N. J. At 25 he took part in the student movement against the Venezuelan dictator General Gomez and associated himself with the men who later were to form the Accion Democratica party. Central University of Venezuela awarded him the degree doctor of political and social sciences.

In 1936 Dr. Perez was chosen to represent the College of Lawyers of the Federal District of Venezuela on a commission to formulate new codes and laws. From 1938 to 1942 he represented the Federal District in the National Congress. In 1939 Caracas named him to a commission for revision of municipal laws. In 1941, winning first place in a general examination, he received a professorship in the first year of civil law from Central University.

DR. JUAN PEREZ ALFONZO

California Standard Starts Test Wells in Venezuela

MARACAIBO.—Standard Oil Co. of California reports one test well under way and two others about to spud on the 2,876,000 acres in three Venezuelan concessions. The test already making hole is on a 31,000-acre tract 50 per cent held by the company at Montanita, in the state of Falcon. On a 1,771,000-acre concession on the west shore of Lake Maracaibo three seismograph crews are at work and two of the largest-type drilling rigs will soon be set up on selected locations.

Production to Be Resumed At Mexican Oil Wells

MEXICO CITY.—Production will be resumed within a few weeks on the oil properties of New England Fuel & Oil Co. in the State of Veracruz, according to Paul Bush, owner. Bush, a Mexican citizen of United States parentage, acquired the properties, including nine wells in the Panuco field, early this year.

Oil Companies Ready to Adjust Labor Problems

BOGOTA.—Following a conference between Minister of Labor Arriaga and oil-company executives at which current labor problems were discussed in the light of the recent token strike, Arriaga announced that the oil companies had agreed to hold direct negotiations with individual unions with a view of effecting friendly adjustments of certain labor-contract provisions. The labor ministry wired local labor inspectors that "a totally new situation is created which union members must appreciate, and it creates a friendly situation with government support."

Britain's Oil Production Is Far Below Requirements

LONDON.—Britain's 240 oil wells are producing about 500,000 bbl. a year, Emanuel Shinwell, minister of fuel and power, told the House of Commons. This fills only a minute part of British requirements, according to figures published for 1938, when 33,929,000 bbl. of oil was imported. During the war years import figures were not published.

Poland Signs Agreement to Import Russian Crude

WARSAW.—The Polish press agency reports that Poland has signed an agreement with Russia for importation of petroleum from the latter country.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Preparedness

THE petroleum industry will shortly have to decide what, if any, industry-wide representation it should have at Washington, now that its war agencies are ending their activities. Can the oil industry in the confusing days ahead further serve the nation, and incidentally itself, by maintaining a representative organization to advise and cooperate with Government?

There are those who contend that this country must drop its traditional policy of minimizing military activities in time of peace and start now to get ready for the next war. They project a program which would retain much of the machinery of the late war, with major additions deemed necessary to cope with assumed war conditions of the future. Petroleum, as the most essential product in the winning of two wars, naturally has a vital part in this planning.

What is basic in preparedness? As to what should have been done before the recent war started, the tragic example of Pearl Harbor is cited, overlooking current testimony at Washington which ascribes that catastrophe to faulty judgment rather than anything else. No amount of preparation, regardless of how extensive, is ever going to offset incompetence in places of high governmental responsibility.

In general there are two types of preparedness. There is that in which the entire economy of a country is directed to war preparation. Under this program a country is controlled by its military, regardless of efforts usually made to conceal that fact. All resources of a nation are drained to support a military program. Taxes are maximum and standards of living for the civilian decline.

The Japs and Germans are representative of this type of preparedness. Other examples, many of them recent, are scattered through the pages of history. They develop great war machines which, to use the language of American football, make a great show in the first half but lose in the second.

The fundamental weakness of this type of preparedness goes deeper than the military and civilian economic phases. It involves the moral fiber of a nation, whence came enemy atrocities.

Then there is the American type of preparedness. This rests on a sound civilian base. When an emergency arrives it has the initiative, the "know how," and the facilities to outdo the enemy in every phase of war. From this springs the innate strength which wins in the last half as the enemy fades. It is this type of preparedness that brought 100-octane gasoline, synthetic rubber, and many other essential contributions. Industry generally not only knew about atomic energy, but when a crisis arose it had the wherewithal to transform it into a bomb.

It will be argued "Let's have both the maximum in civilian and military preparedness." Possibly so. To accomplish that end will require a leadership such as no people have had in the past.

With this background, we favor the idea of a petroleum organization to work with Government. It could aid in avoiding many pitfalls. Our leadership knows that petroleum contributions in war came from the fields and plants of a free industry. All future planning that fails to recognize that fact in this and other industries will fall short of its objectives.

XUM

PAW Program Division Predicts Strong Demand Situation Starting in 1946

by H. Stanley Norman

WASHINGTON. — Postwar world petroleum requirements will rise steadily after the first 6 to 9 months of 1946, it was predicted here last week by the Program Division, Petroleum Administration for War. Changes in global operations during the transition from war to peace will occur mostly in the United States with maximum foreign refinery throughput required to meet demand for fuel products.

The Program Division made seven specific recommendations in its 45-page report designed to guide the petroleum industry through the last quarter of 1945 and the following 12 months. The report emphasized that the forecast of petroleum requirements is not a PAW program and that use of suggested lines of operation is not obligatory in any sense.

"The purpose in presenting these estimates is to furnish a background of information which should prove useful to the individual units of the petroleum industry in determining their own programs," the division explained. Following are the seven specific suggestions for world-wide operations through 1946:

1. That domestic refinery operations be maintained at the highest possible crude runs, limited only by capacity to store gasoline over the winter, with concentration on refining of heavy crudes where a choice is available.

2. That foreign operations be maintained at maximum with particular reference to utilization of heavy crude oils and maximum fuel-oil production during the winter.

3. That all refineries operate for maximum kerosene yields during the winter and adjust relative gasoline and distillate yield to meet full requirements for the latter product.

4. That military purchases of distillate and residual be limited to strictly operational requirements after drawing on existing stocks wherever possible, and postponing any desired stock building until the middle of 1946.

5. That the air forces consider purchasing some 100-octane gasoline before their stocks are entirely depleted, particularly in District 3 (Gulf Coast and Southwest), in order to allow higher crude runs and therefore higher kerosene, distillate, and residual fuel-oil production during the winter.

6. That the industry and all purchasers of kerosene, distillate and residual fuel plan their supplies so as to be able to operate on minimum working stocks during the winter.

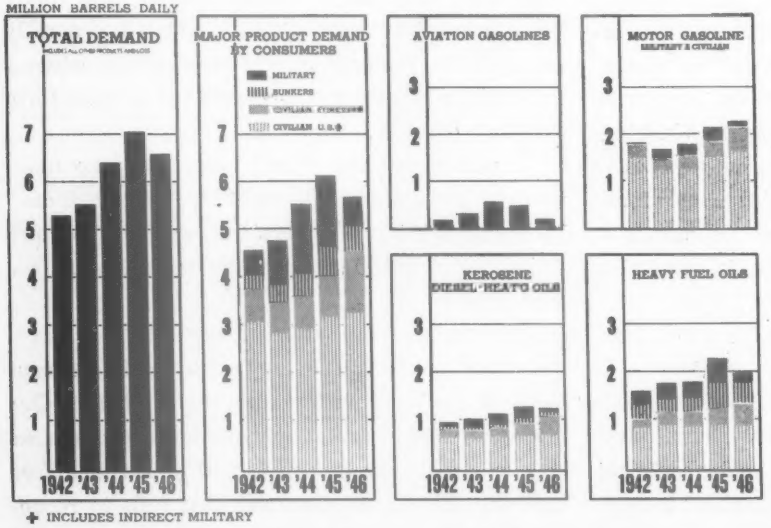
7. That foreign purchasers build gasoline stocks and operate on minimum kerosene, distillate, and residual stocks over the winter, reversing the procedure during the following summer. Even with foreign refineries operating at maximum capacity, the report points out, foreign requirements for gasoline, kerosene,

SUMMARY OF ESTIMATED POSTWAR PETROLEUM PRODUCTION IN COMPARISON WITH WARTIME PRODUCTION[6]

(Worldwide, exclusive Russian areas)

	Thousands of barrels daily									
	Actual			Estimated						
	Year 1942	Year 1943	Year 1944	1st Q 1945	2nd Q 1945	3rd Q 1945	4th Q 1945	1st Q 1946	2nd Q 1946	2nd Half 1946
Crude Oil—										
United States	3,795	4,117	4,583	4,769	4,842	4,761	4,390	4,115	4,220	4,195
Caribbean area[1]	494	584	822	882	970	1,080	1,026	1,022	1,066	1,048
Near and Middle East—										
Eastern Med.[2]	73	99	113	119	123	123	123	123	123	123
Pers. Gulf area and India[3]	246	241	329	379	392	451	489	545	555	555
Other areas—										
Canada	28	26	23	23	23	22	22	22	22	22
Mexico	96	96	104	109	123	115	114	118	118	118
Other Latin America[4]	112	116	115	112	109	109	111	111	111	106
U. K. & W. Europe		2	2	2	2	2	17	17	17	17
Far East							40	50	60	75
Total crude oil	4,844	5,281	6,091	6,395	6,584	6,663	6,332	6,123	6,292	6,259
Other raw material[5]—										
United States	231	249	282	318	318	319	320	300	300	300
Foreign	29	26	28	27	24	25	36	35	35	35
Total other raw mat'l	260	275	310	345	342	344	356	335	335	335
Total petroleum	5,104	5,556	6,401	6,740	6,926	7,007	6,688	6,458	6,627	6,549

[1] Includes Venezuela, Colombia and Trinidad. [2] Includes Iraq and Egypt. [3] Includes Iran, Saudi Arabia, Bahrein, Kuwait and India. [4] Includes Peru, Argentina, Ecuador, Bolivia and Brazil. [5] Includes natural gasoline, benzol, alcohol, shale oil and synthetics. [6] Wartime production excludes Axis controlled areas.



✚ INCLUDES INDIRECT MILITARY

World demand for petroleum products, excluding Axis and Russian areas. Figures are actual to July 1945, and estimated thereafter

SUMMARY OF ESTIMATED POSTWAR PRODUCT REQUIREMENTS IN COMPARISON WITH WARTIME REQUIREMENTS§
(Worldwide exclusive Russian areas)

(Thousands of barrels daily)

	Annual averages					Semiannual averages			
	Actual‡			Partly est.	Estimated	Actual‡	Estimated		
	Year	Year	Year	Year	Year	1st half	2nd half	1st half	2nd half
By major products—	1942	1943	1944	1945	1946	1945	1945	1946	1946
Aviation gasoline*	165	310	566	472	186	640	304	191	183
Motor gasoline	1,617	1,673	1,782	2,126	2,275	1,961	2,291	2,210	2,342
Kerosene	249	253	259	289	329	288	290	336	321
Distillates and diesels	723	768	852	951	908	980	922	949	867
Residual fuels	1,607	1,784	2,084	2,282	1,986	2,318	2,245	2,070	1,902
Total major products	4,561	4,788	5,543	6,120	5,684	6,187	6,052	5,756	5,615
By consumers—									
Civilian:†									
United States	3,074	2,833	2,904	3,181	3,285	3,100	3,262	3,278	3,295
Other Western Hemisphere	402	390	412	453	479	429	476	473	487
U.K. and neutral Europe	137	133	143	170	268	156	185	259	278
Liberated Europe¶	....	....	....	72	285	....	145	253	275
Middle East, Africa, and Far East	141	137	143	155	194	149	160	188	200
Liberated eastern areas¶	....	....	....	7	63	....	13	61	65
Total civilian	3,754	3,493	3,602	4,038	4,554	3,834	4,241	4,512	4,600
Bunkers for ocean vessels:									
United States ports	90	162	235	290	225	322	258	249	202
Foreign ports	185	170	230	287	273	267	307	277	267
Total bunkers	275	332	465	577	498	589	565	526	469
Military—worldwide‖	532	963	1,476	1,505	632	1,764	1,246	718	546
Total major products	4,561	4,788	5,543	6,120	5,684	6,187	6,052	5,756	5,615

*Includes aviation gasoline of below 100-octane grade for the above periods of 67, 122, 152, 85, 38, 43, and 46, respectively. †Includes indirect military. ‡The division by consumers is partly estimated. §Wartime requirements exclude Axis-controlled areas. ¶Limited volumes of supplies provided to liberated areas by the military prior to July 1945 are included under military. ‖The military figures are the requirements indicated after deducting the civilian and bunker estimates from the total demand.

distillates, and lubricating oils will demand considerable exportation of these products from the United States through 1946. Total petroleum exports from the United States will exceed total imports by about 160,000 bbl. per day next year. There was no specific mention of this point in the report but it was obvious from the language that the balance between United States imports and exports is expected to narrow after 1946 when new foreign refining capacity becomes available for supplying world markets.

Here is the Program Division's summary calculations on crude runs to stills compared with wartime operations:

(Data in thousands of barrels daily)

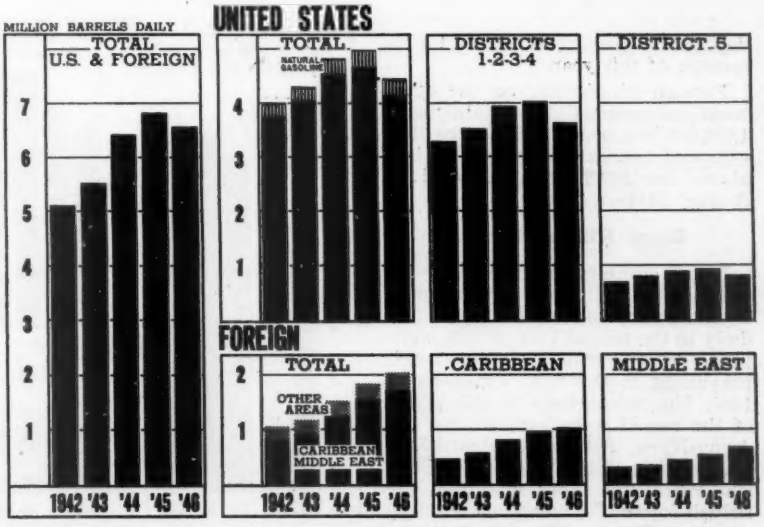
	U.S.	Foreign	Total
1942*	3,654	1,089	4,743
1943*	3,916	1,238	5,154
1944*	4,551	1,469	6,020
1945†*	4,815	1,582	6,397
1945‡¹	4,774	1,749	6,523
1945¶¹	4,530	1,831	6,361
1946¹	4,199	1,940	6,139

*Actual; †first 6 months; ‡third quarter; ¶fourth quarter; ¹estimated.

World-wide refinery operations next year are expected to average 6,100,000 bbl. daily compared with a peak of 6,800,000 bbl. in August 1945. An anticipated decline of 872,000 bbl. in the 1946 average refinery operations in this country compared with the 1945 peak points to a substantial increase in runs to stills of foreign refineries. The foreign increase will result from new and rehabilitated plant facilities in the Persian Gulf, Netherlands East Indies, Borneo, United Kingdom, and continental Europe.

In commenting on the trend in foreign refinery operations, the Program Division's report said "new installations could not have appreciable effect on the 1946 situation but might well change the 1947 outlook for exports from the United States."

World crude-oil production to support the projected refinery operations will average about 6,233,000 bbl. daily in 1946 compared with 6,663,000 bbl. prevailing in the third quarter of 1945. United States production is estimated at almost 400,000 bbl. per day above the 1942 level and slightly above 1943 output. It will decline, however, more than 750,000 bbl. from the peak of 4,930,000 bbl. daily reached last August and will be about 200,000 bbl. per



World petroleum production (crude oil, natural gasoline, benzol, and synthetic) excluding Axis and Russian areas. Actual to July 1945, and estimated thereafter

ESTIMATED POSTWAR REQUIREMENTS FROM UNITED STATES SOURCES FOR MAJOR PETROLEUM PRODUCTS IN COMPARISON WITH PREWAR AND WARTIME REQUIREMENTS

(Thousands of barrels daily)

	Annual averages						Semiannual averages			
	Actual§				Partly est.	Estimated	Actual§		Estimated	
	Year 1941	Year 1942	Year 1943	Year 1944	Year 1945	Year 1946	1st half 1945	2nd half 1945	1st half 1946	2nd half 1946
Aviation gasoline:										
100 octane	33	79	165	365	330	64	490	170	43	84
Other aviation	15	47	103	130	48	30	66	30	29	32
Total	48	126	268	495	378	94	556	200	72	116
Motor gasoline:*										
Civilian†	1,771	1,515	1,240	1,304	1,538	1,641	1,406	1,669	1,573	1,710
Military and export	85	64	182	207	211	183	247	176	188	178
Total	1,856	1,579	1,422	1,511	1,749	1,824	1,653	1,845	1,761	1,888
Kerosene:										
Civilian†	191	190	187	190	196	199	206	186	208	190
Military and export	9	8	14	19	25	40	19	31	38	42
Total	200	198	201	209	221	239	225	217	246	232
Distillates and diesels:										
Civilian†	452	471	462	485	511	511	533	488	537	486
Bunkers for ocean vessels	15	9	15	20	22	16	23	20	16	15
Military and export	53	85	128	174	167	135	186	148	144	126
Total	520	565	605	679	700	662	742	656	697	627
Residual fuels:										
Civilian†	840	871	920	908	920	911	939	902	939	883
Bunkers for ocean vessels‡	133	81	147	215	269	209	299	239	233	187
Military and export	116	192	255	311	275	101	332	217	121	80
Total	1,089	1,144	1,322	1,434	1,464	1,221	1,570	1,358	1,293	1,150

*Includes naphthas. †Includes indirect military and bunkers for other than ocean-going vessels. ‡During the war a considerable portion of U. S. bunkers was supplied by the Navy from imported stocks. §Partly estimated separation between civilian and military.

ESTIMATED POSTWAR UNITED STATES REFINERY OPERATIONS IN COMPARISON WITH PREWAR AND WARTIME DATA

(Thousands of barrels daily)

	Input			Output												
							Total gasoline		Kerosene		Dist. and diesels		Residual fuels			
Total United States:	Crude oil	O. Raw Mat'ls.	Total	100 Oct.	Other Avia.	Motor gaso.†		(%)*		(%)*		(%)*		(%)*	Lubes	Asph.	Other & loss
Prewar:																
Av. 1941	3,861	140	4,001	23	35	1,790	1,848	44.2	199	5.2	518	13.4	938	24.3	109	124	265
War period:																
Av. 1942	3,654	158	3,812	79	52	1,479	1,610	39.7	185	5.1	539	14.8	983	26.9	106	117	272
1943	3,916	175	4,091	167	102	1,361	1,630	37.2	199	5.1	580	14.8	1,144	29.2	106	109	323
1944	4,551	190	4,741	376	128	1,475	1,979	39.3	214	4.7	653	14.4	1,261	27.7	112	109	413
1st Qtr. 1945	4,739	208	4,947	484	64	1,598	2,146	40.9	222	4.7	687	14.5	1,317	27.8	113	87	375
2nd Qtr. 1945	4,892	209	5,101	509	61	1,595	2,165	40.0	209	4.3	706	14.4	1,327	27.1	123	120	451
Postwar:																
3rd Qtr. 1945 (est.)	4,774	210	4,984	330	31	1,826	2,187	41.4	219	4.6	683	14.3	1,267	26.5	119	138	371
4th Qtr. 1945 (est.)	4,530	192	4,722	5	28	1,967	2,000	39.9	236	5.2	687	15.2	1,202	26.5	103	112	382
1st Qtr. 1946 (est.)	4,105	171	4,276	5	28	1,698	1,731	38.0	237	5.8	664	16.2	1,114	27.1	98	80	352
2nd Qtr. 1946 (est.)	4,230	173	4,403	80	29	1,759	1,868	40.1	235	5.6	621	14.7	1,072	25.3	108	154	345
2nd half 1946 (est.)	4,230	172	4,402	84	32	1,722	1,838	39.4	236	5.6	647	15.3	1,061	25.1	107	162	351

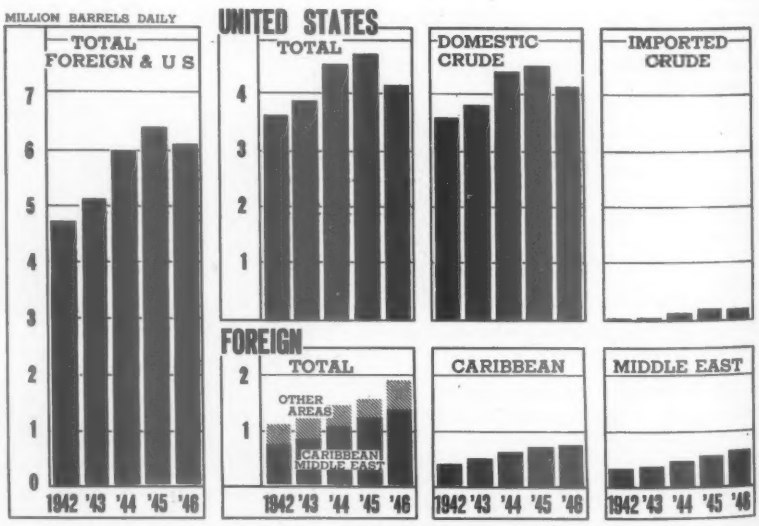
*Percentages based on crude runs with gasoline production from other than crude oil deducted from gasoline output. †Includes naphthas.

day below the output in the fourth quarter of this year.

Foreign production, on the other hand, is expected to remain about 1,000,000 bbl. per day above the 1942 rate and approximately 150,000 bbl. above the peak wartime level of August 1945.

Sharp Military Decline

Direct military requirements for petroleum, the report shows, will decline to approximately 546,000 bbl. daily in the second half of 1946 compared with a peak of 1,764,000 bbl. prevailing in the first 6 months of 1945. The calculations in this phase of the report were supplied by the Army-Navy Petroleum Board for United States forces and by the British Petroleum Representative for British forces. Following are the figures on direct military petroleum demand, all partly or entirely estimated:



World refinery runs, excluding Axis and Russian areas. Actual to July 1945, and estimated thereafter

ESTIMATED DISTRIBUTION OF DEMAND FOR MAJOR PETROLEUM PRODUCTS BY CIVILIAN, BUNKER, AND MILITARY USE WORLDWIDE, EXCLUSIVE OF RUSSIAN AND AXIS CONTROLLED AREAS, YEARS 1942-1943-1944, AND FIRST 6 MONTHS 1945

(Thousands of barrels daily)

	Average year 1942							Average year 1943						
Civilian:£	100 Oct.	Other Avia.	Motor Gaso.	Kero.	Dist.§ and Diesel oil	Resid. fuel oil	Total major prod.	100 Oct.	Other Avia.	Motor Gaso.	Kero.	Dist.§ and Diesel oil	Resid. fuel oil	Total major prod.
United States	...	¶27	1,515	190	471	871	3,074	...	¶24	1,240	187	462	920	2,833
Alaska and Hawaii	...	...	9	1	5	12	27	...	...	10	1	6	8	25
Canada	...	1	65	3	19	29	117	...	1	62	3	19	26	111
Mexico	...	...	14	5	3	42	64	...	...	15	6	3	49	73
Latin America and West Indies	...	2	53	10	25	104	194	...	3	46	11	25	96	181
U.K./Eire	...	...	65	11	36	18	130	...	...	56	10	37	17	120
Europe*	...	...	4	....	1	2	7	...	...	6	1	3	3	13
West and Central Africa	...	...	2	....	2	....	4	...	...	2	1	1	....	4
South and East Africa	...	...	15	2	4	....	21	...	...	11	2	4	....	17
Eastern Mediterranean and Middle East†	...	...	8	12	8	26	54	...	...	8	12	8	29	57
India and Ceylon	...	...	5	11	7	6	29	...	...	5	11	7	5	28
Australia and New Zealand	...	...	17	2	14	....	33	...	...	16	2	13	....	31
Total civilian	...	30	1,772	247	595	1,110	3,754	...	28	1,477	247	588	1,153	3,493
Bunkers for ocean vessels:														
United States ports	...	...	....	....	9	81	90	...	...	....	....	15	147	162
Foreign ports	...	...	....	....	39	146	185	...	...	....	....	34	136	170
Total bunkers	...	...	....	....	48	227	275	..	...	....	....	49	283	332
Indicated military—worldwide‡	98	37	45	2	80	270	532	188	94	196	6	131	348	963
Total demand	98	67	1,817	249	723	1,607	4,561	188	122	1,673	253	768	1,784	4,788

	Average year 1944							Average first 6 months 1945‖						
Civilian:£														
United States	...	17	1,304	190	485	908	2,904	...	16	1,406	206	533	939	3,100
Alaska and Hawaii	...	...	6	1	5	10	22	...	...	4	1	5	11	21
Canada	...	1	68	3	19	29	120	...	1	67	3	22	29	122
Mexico	...	...	15	6	3	52	76	...	1	17	8	4	58	88
Latin America and West Indies	...	3	46	11	26	108	194	...	3	48	13	25	109	198
U.K./Eire	...	...	59	11	39	19	128	...	...	64	11	43	20	138
Europe*	...	1	5	1	4	4	15	...	...	8	1	4	5	18
West and Central Africa	...	...	2	1	1	....	4	...	...	2	1	1	....	4
South and East Africa	...	...	11	2	4	....	17	...	...	11	2	4	....	17
Eastern Mediterranean and Middle East†	...	...	8	13	10	31	62	...	...	9	13	11	34	67
India and Ceylon	...	...	5	11	7	7	30	...	...	6	11	7	7	31
Australia and New Zealand	...	...	16	2	12	....	30	...	...	17	2	11	....	30
Total civilian	...	22	1,545	252	615	1,168	3,602	...	21	1,659	272	670	1,212	3,834
Bunkers for ocean vessels:														
United States ports	...	...	....	....	20	215	235	...	...	....	....	23	299	322
Foreign ports	...	...	....	....	35	195	230	...	...	....	....	41	226	267
Total bunkers	...	...	....	....	55	410	465	...	...	....	....	64	525	589
Indicated military—worldwide‡	414	130	237	7	182	506	1,476	555	64	302	16	246	581	1,764
Total demand	414	152	1,782	259	852	2,084	5,543	555	85	1,961	288	980	2,318	6,187

*Includes only Spain, Portugal, Sweden, and Switzerland. †Includes Eastern Mediterranean, Aden, Red Sea area, Iran, and Iraq. ‡The military figures are the requirements indicated after deducting the civilian and bunker estimates from the total demand. They represent direct military consumption by the United States, British, and other Allied forces but include only that portion of Russian military consumption supplied from United Nations sources outside of Russia. They also include issues by the military for civilian use in liberated areas. §Includes vaporizing oil. ¶Includes volume used by private schools for military training. ‖Civilian figures not fully comparable with annual average due to influence of seasonal factors, particularly in United States. £Civilian estimates represent consumption essential to maintain the civilian economy and produce munitions and other war materials for the military forces.

(Data in barrels daily)

1942, average	532,000
1943, average	963,000
1944, average	1,476,000
1945, first half	1,764,000
1945, second half	1,246,000
1946, first half	718,000
1946, second half	546,000

Many of the wartime operations in the United States were not profitable, the report explained, thus minimizing the over-all impact of curtailed production and refinery runs.

"The surpluses of crude productive and refining capacity during the first 6 to 9 months (1946)," the PAW report points out, "are more theoretical than real in terms of meeting specific product requirements.

(Continued on page 63)

SUMMARY OF ESTIMATED POSTWAR REFINERY CRUDE RUNS IN COMPARISON WITH WARTIME RUNS[5]

(Worldwide, exclusive Russian areas)

	Thousands of barrels daily									
	Actual					Estimated				
	Year 1942	Year 1943	Year 1944	1st Q 1945	2nd Q 1945	3rd Q 1945	4th Q 1945	1st Q 1946	2nd Q 1946	2nd Half 1946
United States	3,654	3,916	4,551	4,739	4,892	4,774	4,530	4,105	4,230	4,230
Caribbean[1]	401	500	626	661	706	764	732	744	744	735
Near and Middle East—										
Eastern Med.[2]	83	104	119	119	120	121	116	119	119	119
Persian Gulf area and India[3]	254	260	330	380	404	437	479	506	506	506
Other areas—										
Canada	149	162	179	150	185	207	165	134	181	178
Mexico	82	90	94	97	100	100	109	113	113	113
Other Latin America[4]	119	119	118	118	118	117	126	126	126	110
U. K. & W. Europe	1	3	3	3	3	3	59	104	104	104
Far East							45	58	68	83
Grand Total	4,743	5,154	6,020	6,267	6,528	6,523	6,361	6,009	6,191	6,178

[1] Includes NWI, Trinidad, Venezuela and Colombia. [2] Includes Palestine, Syria, Iraq, Egypt. [3] Includes Iran, Bahrein, Saudi Arabia, India. [4] Includes Peru, Argentina, Uruguay, Ecuador, Cuba, Brazil and Bolivia. [5] Wartime runs exclude Axis controlled areas.

MIDDLE EAST REPORT No. 10

Egyptian Exploration Is Being Conducted on Broadest Front in History

by C. O. Willson

CAIRO, Egypt.—Plans are now being completed which will mean that the search for new crude-oil reserves in Egypt will be under way on the broadest front in the history of the country whose lands extend into two continents—Africa and Asia. Several geological crews are now at work at scattered points in northern Egypt and four wildcat tests are drilling. Two additional tests will be started in the near future and a seventh test is scheduled for early spud.

This activity follows several years of planning on the part of three companies with most phases of the preliminary work interrupted by the war. With all war restrictions now lifted the exploration programs will be expanded as fast as equipment and manpower are available.

The operating companies and the Egyption Government are anxious to determine the petroleum potentialities of the country as quickly as possible. The present output of 26,000 bbl. daily comes from two fields located on the west coast of the Gulf of Suez. One of these fields—Hurghada—with an output of 1,400 bbl. daily is nearing the end of its commercial operation. Ras Gharib, the other field, has been producing at capacity to supply war requirements. Although only 7 years old it has produced about 40 per cent of its initial reserve which has been estimated to be approximately 110 million barrels. A natural decline in the daily output of this field is assured for the near future. This means that unless new fields are discovered, Egypt will shortly be faced with the necessity of importing additional crude oil and products to supply its peacetime requirements which will be approximately 30,000 bbl. daily.

The refinery output and estimated yearly peacetime consumption in barrels yearly for petroleum products in Egypt follows:

Product—	Production	Consumption
Gasoline	980,000	770,000
Kerosene	420,000	2,310,000
Gas oil and diesel oil	720,000	1,680,000
Fuel oil	5,950,000	5,400,000
Total	7,970,000	10,160,000

The accompanying map shows the locations of the exploration permits which cover about one-third of northern Egypt, which is 600 miles wide and 300 miles deep. The exploration companies are: Standard Oil Co. of Egypt, S.A. (Standard of New Jersey); The Anglo-Egyptian Oilfields, Ltd. (Royal Dutch-Shell); Socony-Vacuum Oil Co., Inc., and South Mediterranean Oilfields, Ltd., a subsidiary of the Cal-Tex Co. (Standard of California and The Texas Co.).

The South Mediterranean Oilfields, Ltd., following the completion this spring of a dry hole at Khatatba, 25 miles northwest of Cairo, announced that it would withdraw its operations from this country. The properties of the company will be taken over by the other three interests. The company, which has an office and geological laboratory in Cairo and one drilling rig, was engaged in exploration activities in Egypt over a 7-year period starting in 1938.

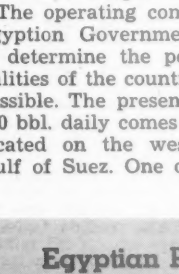
Government Controls

Oil operations in Egypt are carried on under the direction of the Department of Mines and Quarries of the Ministry of Commerce and Industry. The regulations adopted in the thirties, in general, provide governmental controls similar to those in effect in other countries where operations include both exploration and development. Three sets of regulations are effective.

In the case of the Petroleum Exploration Permit the permit is for 1 year and may be extended 1 year if work has been carried on but is not completed. The maximum area covered by one permit is 100 sq. km. (24,711 acres). The form is rectangular with no side less than 5 km. (3.1 miles). The fee is 10 Egyptian pounds ($41.50). The government is given a complete report on the geological information obtained.

To cover further operations a petroleum prospecting license is issued for a period of a year. The fee for this license is 25 Egyptian

Egyptian Petroleum Head Was Trained in U. S.

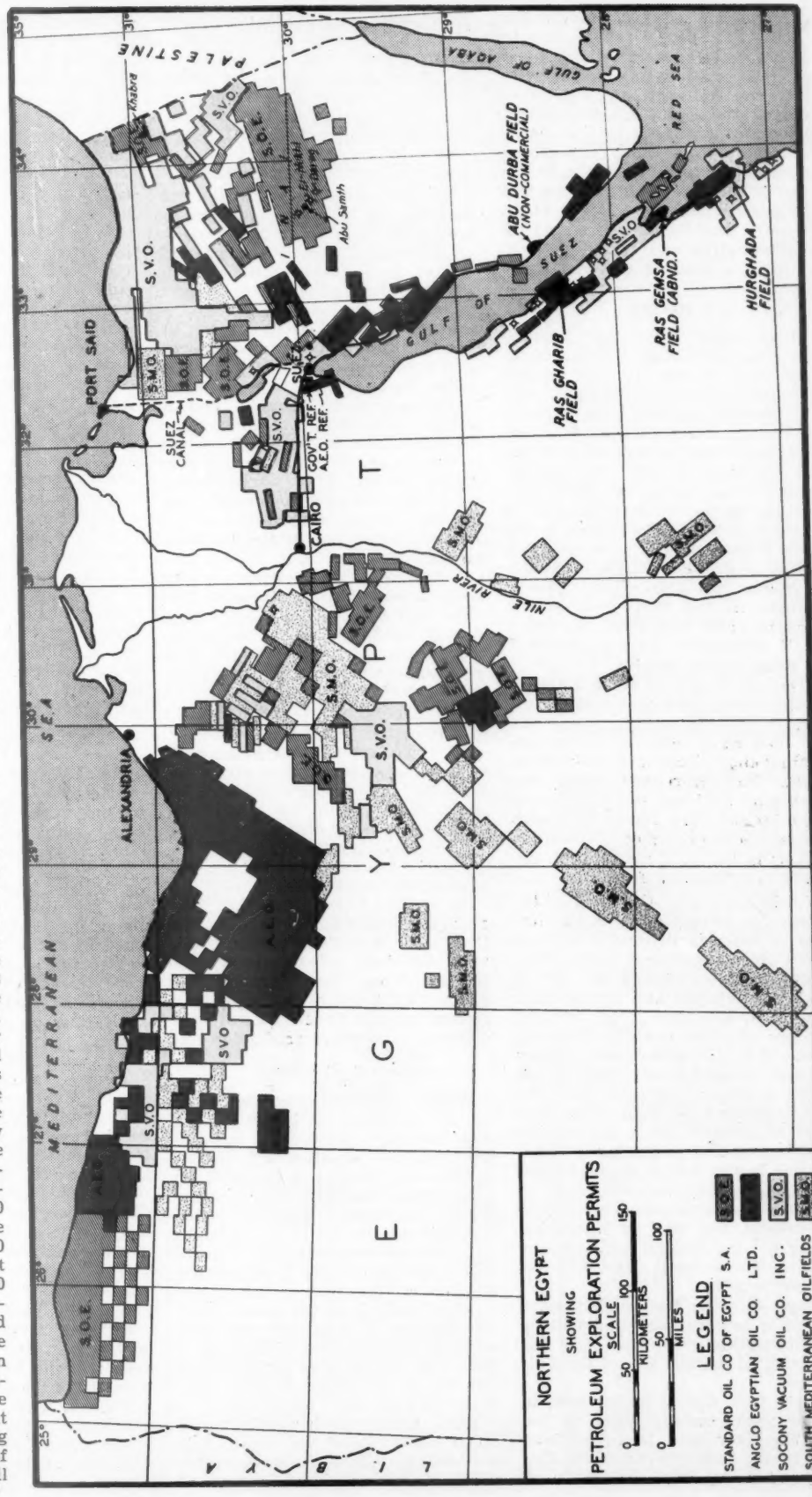


ALL oil men in Egypt know El Hanafe E. L. Fahmy, assistant director of the Department of Mines and Quarries of the Egyptian Government. He will also be remembered by many engineers and geologists in the United States. El Hanafe E. L. Fahmy in 1923 graduated in mechanical engineering in the School of Engineering located at Cairo, Egypt. He was given a scholarship and after 2 years of study was graduated in petroleum engineering from University of California. In order to secure practical experience in oil operations before returning to Egypt he worked for Marland Oil Co. for 2 years in Oklahoma and Texas fields.

He returned to Cairo in 1928 and since that time has been affiliated with what is now known as the Department of Mines and Quarries. He has been closely associated with the oil industry and has been largely responsible for the regulations now in effect. He lists four major objectives in the government's program for future oil development. These are: (1) Train Egyptians in petroleum operations; (2) improve standard of living; (3) fuel industry and transportation; (4) assist outside companies in developing Egypt's petroleum resources.

pounds ($103.75) per square kilometer (247.11 acres). During the first year geological exploration must be done which entitles licensee to a 1-year renewal. During the renewal he must start drilling. The area must be a rectangle with no side less than 1 km. (3,280 ft.) and the entire area covered by the license must not be less than 4 sq. km. (988.44 acres). While prospecting license is effective the lessee may make application and secure a mining lease within the prospecting area. This lease must be in the form of a rectangle with no side less than 500 m. (1,625 ft.). The area must contain a productive well.

The regular petroleum mining lease which must be obtained before oil is produced, is for a period of 30 years with the privilege of a 15-year extension. The government charges a fee of 2½ Egyptian pounds per hectare ($4.20 per acre). This fee is deductible from the royalty payment. The royalty payment is 15 per cent of the crude oil produced. Payment is either in cash or in kind at the government's option. In case the lessee does not have sufficient refinery capacity for the output the government has the privilege of buying 10 per cent of the crude oil at a 10 per cent discount or it can buy 10 per cent of the production as finished products from the refining operation at 10 per cent discount. The lessee must maintain at least one drilling rig over a period of 20 years or until



Pipe line between Suez and Cairo was built as war line by U.S. and British Governments. Program of future ownership and operation has not yet been decided

a production of 1,000 tons (about 7,000 bbl.) per square kilometer (247.11 acres) is secured, i.e., about 2½ tons per acre per annum.

There are various regulations which are largely concerned with the protection of the government in financial matters and the enforcement of conservation rules. In the case of the prospecting license and the mining lease 90 per cent of the laborers must be Egyptians and the administrative and technical staffs must be at least 50 per cent Egyptians.

History

With some authorities pointing out that petroleum through seepages was known to the ancient Egyptians, actual exploration work and shallow drilling date back to 1885 when shallow drilling was carried on in the Gemsah area on the Gulf of Suez. In 1899 three deeper tests were drilled in the same area. Over a period of several years a number of tests were drilled in the Gulf of Suez area. It was not until 1909 that the predecessor of Anglo-Egyptian Oilfields, Ltd. (Shell) brought in the first well in the Gemsah area. This field showed a small production over a period of 16 years ending in 1927.

The search for oil along the Gulf of Suez continues up to this time and reports show that more than 100 tests have been drilled not including those located in the proven areas. The Hurghada field was opened in 1913 and the Ras Gharib field in 1938. The latter field with a reserve in excess of 100 million barrels is the only major field discovery in Egypt so far.

Anglo-Egyptian Oilfields, Ltd., discoverer and operator of the Ras Gharib field, is drilling a wildcat test 15 miles northwest of the field. About 15 miles east of the city of Suez the company and Socony-Vacuum Oil Co., Inc., are drilling another test. This is about 1½ miles from the 1 Ayun-Musa (Moses Spring) which has attracted considerable attention this year. The first test encountered a large water flow between 300 and 700 ft. and trouble was experienced in getting it under control. It was drilled to about 5,500 ft. and recently was completed as a water well at the shallow depth. At present the well is furnishing water for the second test which is drilling. The water is slightly brackish but potable.

Anglo-Egyptian has secured delivery on a new rig and this will be used in testing a structure near Ras Metarma on the east side of the Gulf of Suez.

Other tests drilled in this area in recent years include eight in the Ras Shukhair and Desht el-Daba area by the Socony-Vacuum Oil Co., Inc., and six by Standard Oil Co. of Egypt north of Ras Gharib. Socony-Vacuum, as soon as personnel is available, will drill another test in the Desht el-Daba area. No oil was discovered in these tests and some of the prospecting licenses have been surrendered.

Gulf of Suez Geology

The geological history of the geotectonical Gulf of Suez and Red Sea area is different from other districts of northern Egypt as it represents one of the classical zones of subsidence. During the Miocene period a tectonic trough started to be formed and the Miocene sea ingressed the newly formed depression laying down a huge amount of saline deposits such as gypsum, anhydrite, rocksalt, dolomite and in places marls rich in globigerinae. The structures of the Gulf are due to tension and therefore have a very typical aspect. They are asymmetric faultblocks usually with a long, gentle flank on one side and downfaulted zone of regional subsidence on the other side.

Gebel Zeit, Esh Melaha, and the ridge north of Tor belong to that structural category, as do the producing fields of Gemsa, Hurghada, Abu Durba, and Ras Gharib. The producing fields have a much smaller longitudinal extent than do the structures aforementioned which are exposed.

It would appear that in such an area seismograph surveys are of little value. Interesting results are being obtained with the gravimeter and the discovery of the Ras Gharib field is largely attributed to results of torsion-balance work which was later confirmed by gravity meter.

In the Ras Gharib field the Miocene lies unconformably over the Cretaceous and Carboniferous beds with the bulk of the production coming from the Carboniferous sands. Exploration work in this general area is directed toward the discovery of further production.

Other Provinces

While most of the actual test drilling to date has been in the Gulf of Suez and Red Sea area, it is probable that this situation will change as more information is obtained on other areas with their larger structures. Considerable attention is being paid to the North Sinai province where Standard Oil Co. of Egypt has drilled two tests and has another drilling with a fourth test to start drilling in the near future. The first test of Standard was located about 70 miles east of the city of Suez and is known as the El-Nekhl test (shown on map). It was abandoned at 5,566 ft.

The 1 Darag which was located 6 miles southeast of the Nekhl test was drilled to 2,768 ft. by the company. It was completed in June of this year. The company is now drilling the 1 Abu Samth, 5 miles northwest of the Nekhl well. A location has also been made for the 1 Khabra on a location which is about 6 miles from the Palestine border and 25 miles from the seacoast. The company has purchased a new rig for this test which will be the first wildcat drilled in the northeast section of Sinai.

It is reported that another company will drill a test in the northeast part of Sinai near the coast. Activity on the Palestine side of the boundary is also predicted.

In both the structural and the stratigraphic sense the North Sinai province represents the southwestern continuation of the Syrian-Palestine belt. Its characteristics are a great development of Jurassic strata and huge, asymmetric anticlinal uplifts. Gravity meter and seismograph surveys in connection with surface studies are the basis for the exploration work in this area.

In this area it is feasible to map the Eocene and older strata. In the Mediterranean area the objective is to test Jurassic beds. At the same time it will be possible to determine the possibilities of the Cretaceous series. Along the mountains inland from the coast in northern Sinai there are limestones and sandstones which are Triassic.

Western Desert Province

As shown on the map, it is in the Western Desert Province that most of the exploration permits are located. Very little drilling has been done in this area. The Leon well located near Mersa Matruh was drilled to 2,000 ft. The Daba well was drilled by Anglo-Egyptian Oilfields, Ltd., to 6,000 ft., and the Khatatba test previously referred to was drilled to a depth of approximately 7,000 ft. All were dry holes. It is understood that a thick section of shales was obtained in the Khatatba test.

This area has a large exposure of Oligocene, Miocene and Pliocene strata. Huge areas are hidden below alluvial and wind-blown desert so that geophysical methods have to be employed to obtain information as to the tectonic possibilities.

Near the Giza pyramids a short distance west of this city there is a large outcropping of the lower Eocene and the upper Cretaceous. The Cretaceous Nubian beds also outcrop in this general area.

What is known as the eastern desert lies between the Nile River on the west and Suez, the Gulf of Suez and the Red Sea on the east. Only 160 of the total 960 permits are located in this area. This district which as a whole is excellently exposed comprises a Tertiary area with one or two small Cretaceous inliers.

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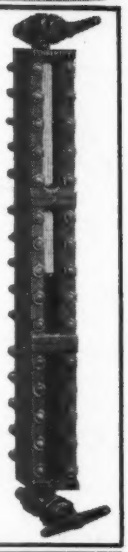

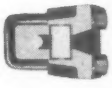

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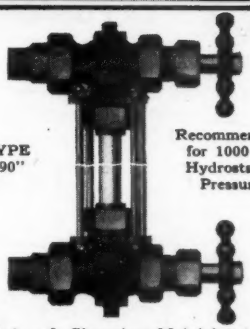

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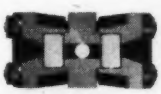

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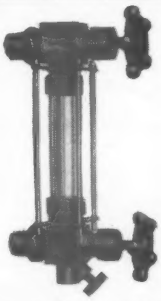
LIQUID LEVEL GAGES



Body made from a special high strength alloy iron, shanks alloy steel and trim stainless steel. Extra heavy construction throughout, automatic and positive shut-off if glass breaks, heavy duty stuffing boxes. Conform with A.P.I.—A.S.M.E. requirements.

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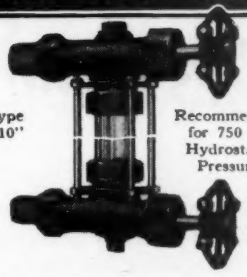

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Tight Situation Seen in Supply Of Kerosene, Distillate, Residual

by Stuart P. Coleman

This is a digest of a paper presented at the A.P.I. meeting. It deals with two situations. The first is a short-term forecast covering the winter season of 1945-46 and the indicated adjustments of refinery yields necessary in PAW Districts 1 and 3. The second is a long-range forecast covering the world situation to 1965, indicating the apparent major outlines.

THERE are some short-term problems in regard to the supply of kerosene, distillate, and heavy fuels on the Gulf Coast and the Atlantic Seaboard over the coming winter, which also apply in varying degree to other areas of the country. A tight situation is indicated in the supply of kerosene, distillate, and residual fuel oil, and substantial changes in refinery operations are indicated as necessary if requirements of these products are to be met.

Under normal conditions the usual economic forces would reflect themselves in price changes to correct this lack of balance, but this has not occurred because of the existing controlled price structure. Because of the war hangover, abnormal properties exist between product requirements. This, plus the loss of production during the strike, results in a situation where marked changes in refinery operations must be made in the general direction indicated in the table below, if a situation does not arise later in the winter where it will be physically impossible to increase refinery yields sufficiently to meet consumption, particularly of distillate.

The long-range picture is an entirely different matter. It is based on industry-committee estimates of long-term world requirements recently presented to a special Senate committee, plus some further breakdown by products.

Excluding Russia, which is estimated to be self-contained, total world consumption is forecast to rise over the next 20 years by over 3 million barrels daily. The cumulative total for the period amounts to approximately 60 billion barrels, or more than the total cumulative world consumption to date. In the United States, domestic consumption is anticipated to rise from slightly over 4 million barrels daily in 1941 to just under 6 million barrels. Excluding Russia, total foreign demand is estimated to rise from slightly under 2 million barrels daily in 1938, last full prewar year, to about 4 million barrels daily in 1965, or to about double prewar consumption. These estimates assume a relatively high level of domestic industrial activity and a resumption of normal trade abroad.

Again excluding Russia, world crude-oil reserves are now estimated at about 60 billion barrels, almost triple the reserves estimated 10 years ago, despite the greatly stimulated consumption during the war. Large promising areas have been only partly explored, or are still untouched, with potentialities indicated by the fact that the United States has supplied two-thirds of the world's oil to date, while containing only an estimated one-seventh of the area considered promising for oil by geologists.

The primary purpose of this forecast is to analyze individual product demands in relation to available types of crude oils and refinery processing techniques. The most important development is the war stimulated development of catalytic cracking to increase yields of gasoline and obtain lighter products at the expense of heavy fuel oil. It is felt the estimates used are accurate enough to provide a framework to illustrate the most important elements involved.

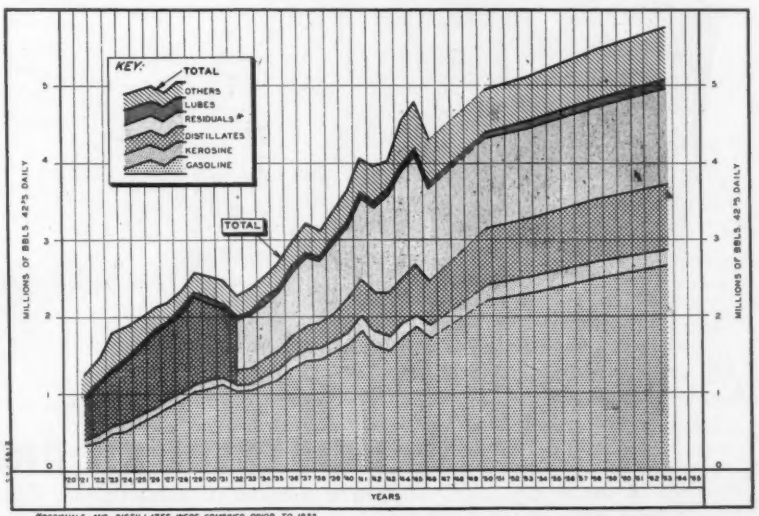
In foreign areas the demand for residual fuel oil constitutes a greater percentage of the total than in the United States, and in the United States there is a need to supplement production of fuel oil at domestic refineries by imports. For these reasons the required degree of intensity of processing in foreign refineries is not as high as in this country, and it is not felt there are any serious problems to be met in meeting foreign product demands from foreign crudes and foreign refineries.

In the United States because of the relationship between the price of fuel oil and crude, due largely to fuel-oil competition with coal, the economics of the supply and refining

PAW DISTRICTS 1 AND 3—ESTIMATED REFINERY RUNS AND PRODUCT YIELDS

	1	2	Possible extreme alternatives —1st quarter 1946	
	4 Weeks ended Oct. 27, 1945	Est. required 4th quarter 1945	3 When meeting all product demands	4 When producing minimum residual fuel
Crude runs to stills	2,204,000 B/D	2,320,000 B/D	2,307,000 B/D	1,873,200 B/D
Yields of:				
Gasoline	38.2%	35.7%	32.7%	40.3%
Kerosene	6.3	6.5	6.7	8.3
Distillates	18.0	20.8	20.0	24.6
Residual fuel	22.6	24.8	29.1	12.7
All others	14.9	12.2	11.5	14.1
Fuel oil deficiency before consideration of imports		175,000 B/D*	0	433,800 B/D

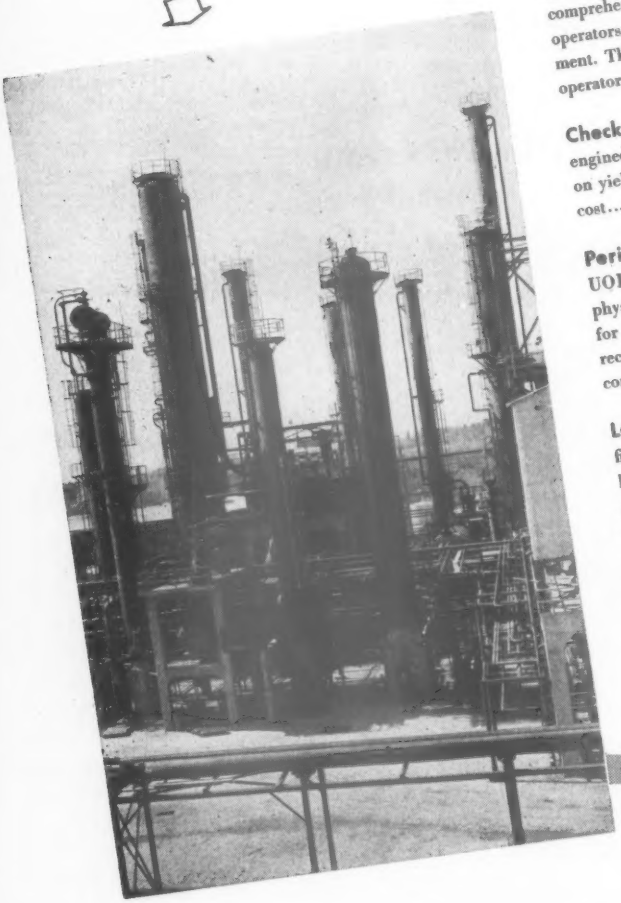
*Probable maximum available imports.



Consumption of petroleum products in the United States (1921-1965)

How U.O.P. Service Protects your Refinery

Developing refining processes, designing refinery equipment, and supervising its construction, are the functions of UOP with which the Petroleum Industry is most familiar . . . a familiarity which has grown through our years of successful service. ● But . . . unless you are a UOP licensee, you may not realize that our interest does not cease when a unit is completed. In fact, that is when one of our most important activities starts to function. ● What we refer to is UOP Service . . . the constant vigilance which we maintain over every UOP unit after it goes on stream and the numerous facilities which we make available to our licensees. ● It is a service to which every refiner is entitled . . . and a service which every UOP licensee gets.



Operator Training: When a new UOP unit is completed and is functioning properly, our operating men institute a comprehensive training program to impart to the licensee's operators a thorough knowledge of the operation of the equipment. This program is not considered completed until the operators are fully qualified to carry on successfully.

Check on Operating Efficiency: We send expert service engineers to each licensee's refinery. They make careful checks on yield . . . determine the degree of operating efficiency and cost . . . and render such advice and counsel as may be necessary.

Periodic Inspection: At regular intervals each licensed UOP refinery is visited by our inspection men. They make physical inspection of the licensed units, testing instruments for accuracy, checking up on corrosion and fire hazards, and recommending such steps as may be found necessary to assure continued high efficiency.

Laboratory Service: We have what we believe to be the finest and most fully equipped oil research and development laboratories in the world, manned by experienced technologists. These facilities are available to all UOP licensees to aid them in solving their many refinery problems.

Engineering Service: The services of our engineers are constantly available to our licensees to study and analyze special problems and recommend steps to be taken for their solution.

This, in brief, is UOP Service . . . the kind of service that demonstrates our lifetime interest in the efficient, economical operation of every UOP unit.

UNIVERSAL OIL PRODUCTS COMPANY

310 S. MICHIGAN AVENUE CHICAGO 4, ILLINOIS, U.S.A.

UNIVERSAL SERVICE PROTECTS YOUR REFINERY

situation are different. For years the United States refineries have constantly tended to reduce the yield of heavy fuel oil; because it is cheaper to produce gasoline from residual fuel than from crude oil. Now catalytic cracking represents over one-half the prewar cracking capacity and it is possible to supply gasoline, kerosene, and distillate requirements with residual-fuel yields of 10-12 per cent on crude run, thereby supplying light-product requirements in the future with less production of heavy fuel. It would thus appear that imports of heavy fuel or fuel producing crudes will be required in increasing amounts to supplement U. S. refiners' by-product production.

Considering supplies of light products, other than heavy fuel, there is no question of the adequacy of existing refining facilities to meet gasoline requirements. Kerosene and distillate demands will require higher yields from the crude run. The growing demand for diesel fuels, requiring virgin, uncracked gas oil, will probably require a shift in cracking feed stocks away from the lighter gas-oil cuts toward the heavier feed stocks and cycle fractions, plus fuel oil.

PAW Predicts Strong Demand Position

(Continued from page 55)

"During the war, potential physical capacity was utilized to the maximum with the aid of governmental compensation, both direct and indirect, for abnormal costs. During the coming winter the capacity to produce residual fuel oil and kerosene and distillates to some extent, will be limited to economic considerations. . . .

"Total refinery runs of crude oil in the United States will be limited by gasoline demand and capacity to store motor fuel through the winter. Economic considerations will limit the percentage yield of residual obtained from the limited crude runs. As a result of these two factors there will be no appreciable surplus capacity, above that required to meet estimated residual-fuel demands, which can be operated profitably until the middle of 1946."

In another section of the report, it is pointed out that much of the obsolete refinery equipment which cannot be longer operated profitably will be retired. It follows that new construction must be employed to restore the normal peacetime margin of theoretical operating capacity against actual runs in preparation for increases in domestic markets which will develop in the latter part of 1946.

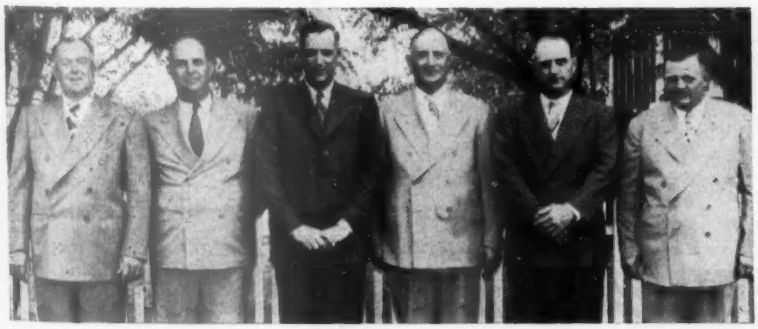
Big Chief Drilling Co. Revises Its Setup

OKLAHOMA CITY. — The corporate setup of Big Chief Drilling Co. and its affiliated interests has undergone revision, W. T. Payne, founder and president, announces. S. V. Hodges and Jack H. Abernathy have been made vice presidents, and F. E. Godfrey is now secretary.

Hodges, tool pusher for Big Creek and partner in Hodges-Payne Drilling Co., and Godfrey, office manager, have been with the Payne interests for years. Abernathy recently resigned as assistant production superintendent of Sunray Oil Co. to join Payne here.

Payne has organized Payne Petroleum Corp. as a personal holding company to include producing and nonproducing lease and royalty interests.

Robert Dalgleish, who was with Big Chief in the Illinois basin, has been moved to Oklahoma City, taking charge of leases, royalties and contract work. The Big Chief partnership with H. L. Rowley, is not affected in the changes. A biographical sketch of Payne appears on page 132 of this issue.



The six Hollandsworth brothers, all oil men, met recently as a group for the first time in 30 years at Longview, Tex., where their mother resides. Their two sisters married oil men. All eight were born near Huntington, W. Va. The brothers began work in oil fields of that state. In the picture: B. T. Hollandsworth, superintendent for The Ohio Oil Co., Bakersfield, Calif.; G. J. Hollandsworth, independent operator, Longview; R. D. Hollandsworth, Hollandsworth Oil Well Servicing Co., Bakersfield, Calif.; R. B. Hollandsworth, independent operator, Dallas; E. L. Hollandsworth, owner, Hollandsworth Drilling Co., Longview; F. G. Hollandsworth, tool pusher Hollandsworth Drilling Co., Longview

Sena and Southern Union Successful Oil Bidders

DURANGO, Colo.—Southern Union Production Co., Dallas, and J. D. Sena, Jr., Santa Fe, N. M., were the successful bidders on oil and gas leases covering 3,440 acres of Indian land on Barker Dome, San Juan County, New Mexico.

DEATHS

William H. Tell, 64, retired assistant manager of sales for Standard Oil Co. (Indiana), died November 23 in Chicago. He was associated with the company 40 years and was the father of William K. Tell, attorney for The Ohio Oil Co.

William J. Hurd, 61, oil producer and drilling contractor, died November 18 at Irishtown, near Bradford, Pa.

John J. McCormick, formerly chief engineer at the Bayway refinery of Standard Oil Co. of New Jersey, died November 16 in Elizabeth, N. J. He had been in the company's service 25 years when he retired in 1937.

Lindsey H. Dunn, 61, independent oil operator of Houston, died November 20.

Edward F. Miller, 62, formerly vice president of Oil States Petroleum Co. of New York, died November 22 at Scotch Plains, N. J.

Fred H. Kerr, 59, for 30 years district manager for Magnolia Petroleum Co., died November 22 in Houston.

Neal H. Stolebarger, 60, for the past 20 years chief engineer for Southwestern Gas & Electric Co. at Center, Tex., died there November 23.

William A. Myers, 70, operator and contractor in the Pennsylvania, Illinois, Oklahoma, and Rocky Mountain oil fields, died in Denver, where he had resided since 1923. Myers discovered the Hiawatha oil and gas field, Moffat County, Colorado.

Henry D. Wiltse, 77, who in 1913 drilled the first oil well in Lance Creek field, Wyoming, died at Newcastle, Wyo., November 3. He had production in the Osage field at the time of his death.

XUM

Lake Creek Cycling Project Example Of Applied Engineering Technique

by E. H. Short, Jr.

THE extraordinary, inherent characteristics of the Lake Creek field itself, together with the engineering technique developed and applied in the various phases of operations, make The Superior Oil Co.'s cycling project in this field perhaps the most interesting activity of its kind in the Greater Coastal area.

Gas production from this field is coming from seven main individually completed zones in the Wilcox formation, which, according to composite electric-log data, range in depth from approximately 9,200 to 11,500 ft. These seven zones are designated alphabetically from "A" to "G," as shown in Fig. 1.

The Lake Creek area is the richest known gas-distillate field in Texas. The initial volume of gas in place has been estimated at approximately 245 billion cubic feet and the hydrocarbon liquid in the wet gas originally in the reservoir is estimated at 30 million barrels. As of August 1, 1945, Superior's cumulative gas production from all zones amounted to approximately 20.7 billion cubic feet, with a liquid

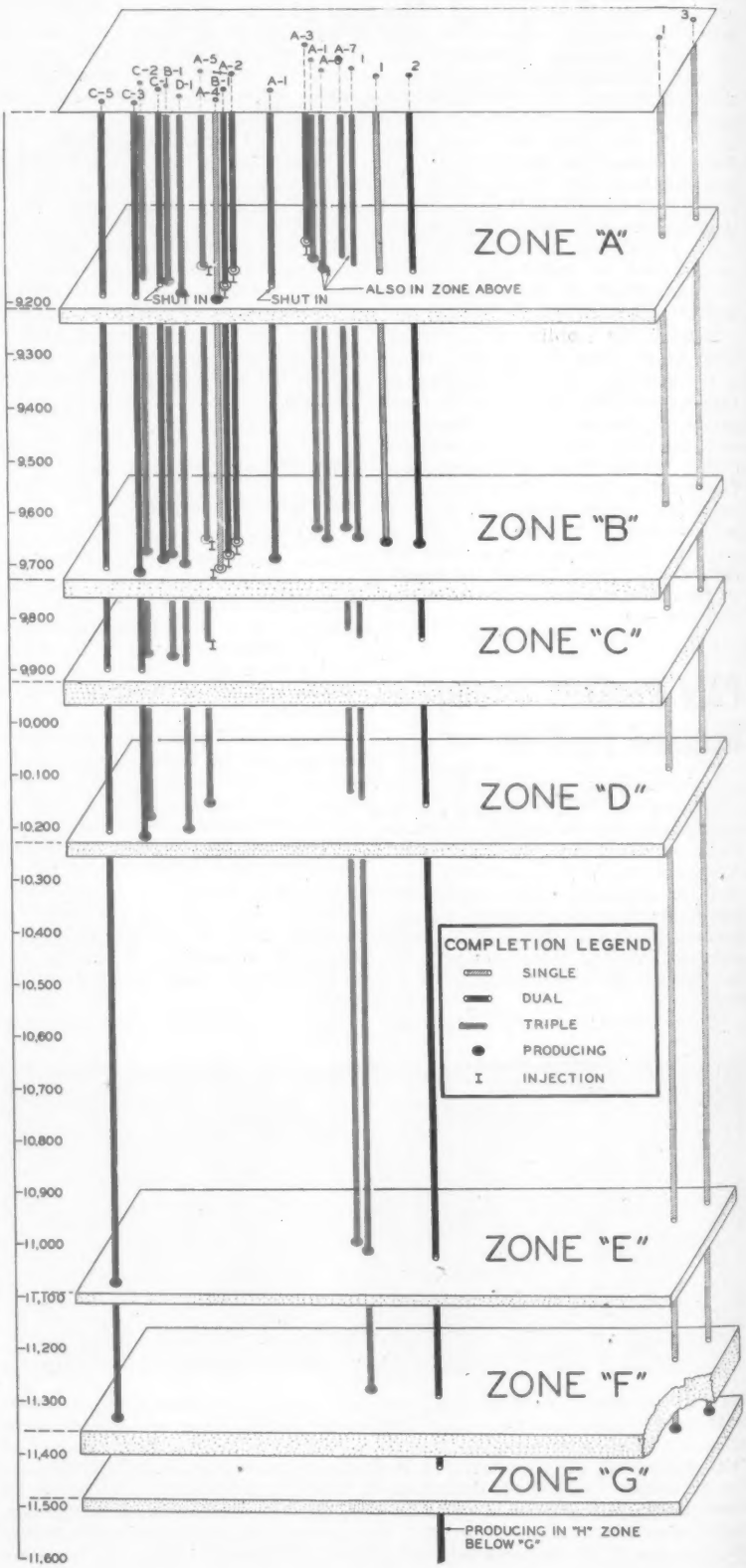


Fig. 1—This peg model of the Superior wells in Lake Creek field shows the involved conditions successfully met in development of the field. There are 4 single, 8 dual, and 8 triple completions, a total of 20 wells which serve the same purpose of 44 wells drilled and cased to produce from only 1 zone. Tops and bottoms of zones are based on principal sections in each zone as shown by composite electric logs. A number of tests have been made on the No. 1 sand and although favorable showings of oil and gas have been obtained, very little oil or gas has yet been produced. Zone H produced in Superior 1 South Texas Development Co., from perforations between 11,589-619 ft. (subsea) but was plugged back to B zone when trouble developed during workover in zone H

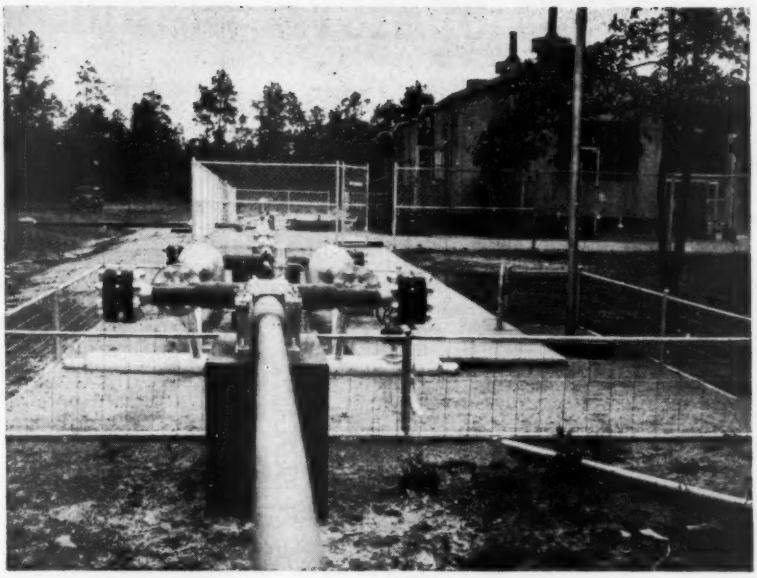


Fig. 2—In foreground is the 4,100-lb. intake line to booster station. Seen in the approximate center are two scrubbers. Liquid knocked out goes into 8-in. by 12-ft. pipe accumulators on ground and at right angle to setting. Scrubbers are equipped with Magnetrol automatic shutdown device which shuts down engines when predetermined level in accumulators is reached. Booster plant, which kicks injection pressure up to 5,000 lb., is seen in right background

hydrocarbon recovery of over 3.2 million barrels.

It was during the development of this field that Superior worked out a successful method of triple* completion. Seven wells have been completed in this manner as shown in Fig. 1.

Stripped gas is being injected into the formations, in some cases, at a maximum pressure of 4,950 psi.

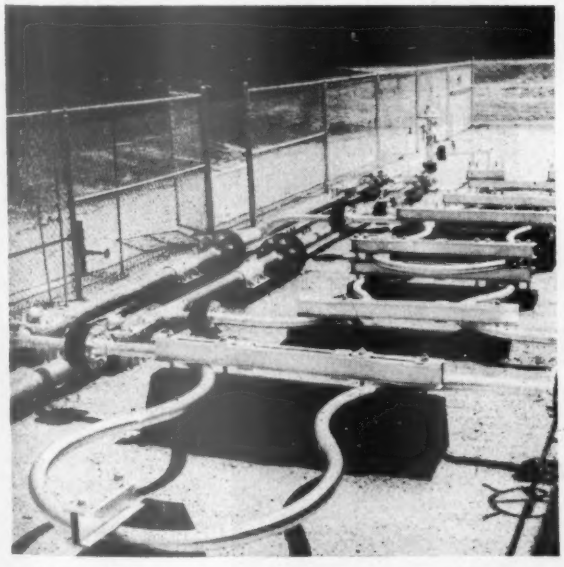
The Lake Creek gas-condensate field is in Montgomery County, Texas. This area is approximately 37 miles northwest of Houston. Structurally, the field is dome shaped, with a northeast and southwest longitudinal axis. Wells on this structure produce from the Wilcox group (Eocene system) having a thickness of over 5,000 ft. The most extensively developed zones, "A" and "B," are considered to be fairly regular and continuous; while observations indicate the lower six zones to be of lenticular sand nature. Pertinent data on the Superior

*First Triple-Zone Completion in Texas Successfully Made in Lake Creek, E. H. Short, Jr., The Oil and Gas Journal, October 21, 1943.

TABLE 1

Zone	No. of wells	Average subsea* depth to top of sand	Daily initial production: Gas prod. (M.c.f.)	Daily initial production: Bbl. liquid hydrocarbon	Cumulative production from completion of first well in Feb. 1941 to July 1944: Gas (M.c.f.)	Cumulative production from completion of first well in Feb. 1941 to July 1944: Liquid hydrocarbon recovery, bbl.
A	10	9,038	620-1,951	51-422	1,789,399	300,957
B	13	9,578	825-3,120	131-440	3,140,188	676,379
C	2	9,768	870-4,200	43-444	532,854	75,705
D	3	10,047	1,755-2,472	216-420	487,605	93,987
E	2	10,819	705-3,619	100-240	236,759	35,676
F	1	11,145	3,480	425	3,845	582
G	2	11,376	3,957-4,656	151-185	786,389	48,486
H†	1	11,480	3,019	256	546,089	52,371
Total					7,514,128	1,284,143
Total all zones as of August 1945					20,705,171	3,219,625

*Elevations range from 154 to 238 ft. †Plugged back to B due to workover trouble in H.



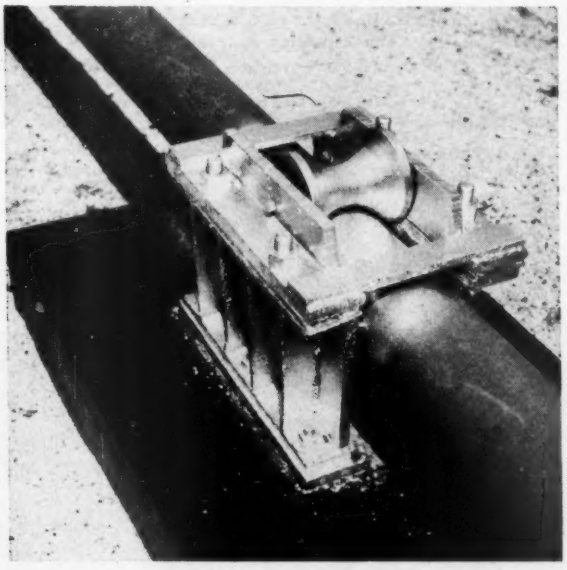


Fig. 3—(Left) Superior-designed expansion loops. By laying down and adequately supporting 3-in. loops movement is allowed in any direction. Fig. 4—(Right) Roller pipe support, designed by Superior, used to take care of expansion movement on both intake and discharge lines in the vicinity of the plant. Rollers are especially designed castings. These supports are set in concrete. Note that rollers are kept in snug contact with pipe by means of adjusting bolts. Contact between lower portion of support and roller member is separated by rubber gasket

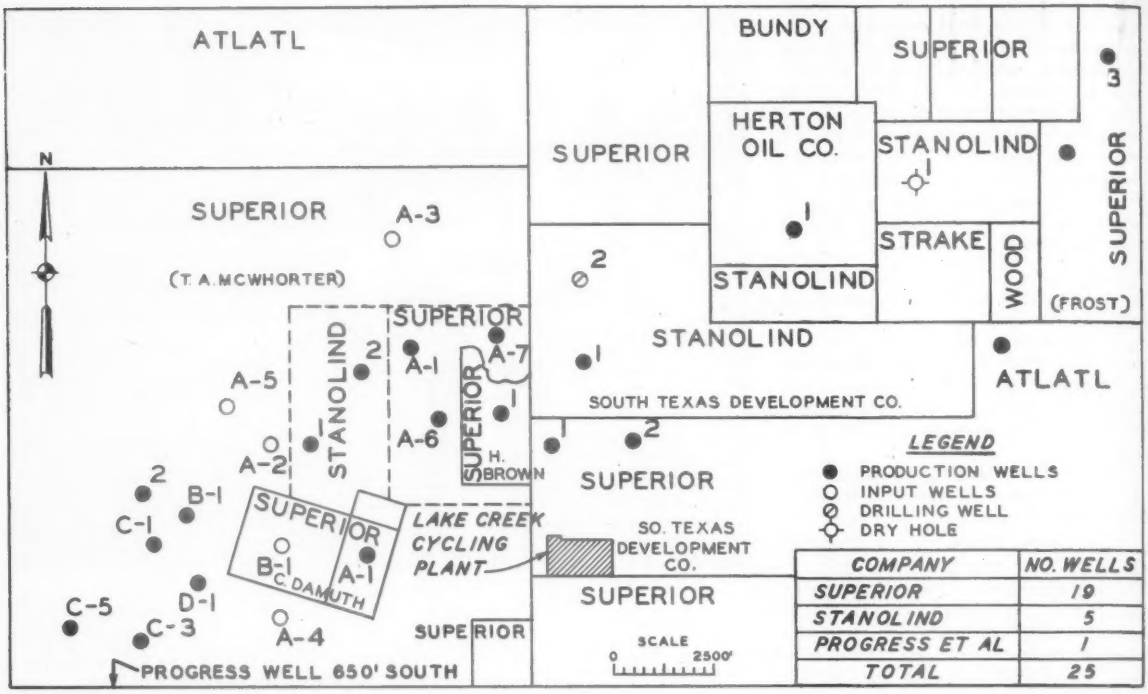


Fig. 5—Map showing extent of Lake Creek field. Approximately 5,000 acres are defined. Participating companies and wells operated are seen in lower right-hand corner of map

wells in the principal zones in this field are shown in Table 1.

The discovery well, Superior A-1 McWhorter, was completed in the A zone in February 1941. The A formation was encountered from 9,212 to 9,217 ft. (depth from surface) and produced initially 800,000 cu. ft. of gas and 195 bbl. of liquid hydrocarbon. Subsequently 19 wells were drilled by Superior and completed in the zones as shown in

(Continued on page 98)

TABLE 2—SUMMARY OF PRESSURE AND TEMPERATURE DATA IN THE LAKE CREEK FIELD, BY ZONES

(Data estimated and calculated)

Zone	Original reservoir pressure (psi.)	Depth at midpoint between top of gas formation and probable water table (subsea)	Reservoir temperature at depth indicated
1	3,980	8,660	243
A	4,150	9,050	246
B	4,400	9,600	250
C	4,480	9,780	251
D	4,610	10,070	253
E	4,960	10,840	259
F	5,115	11,180	262
G	5,190	11,350	263
H_1	5,260	11,515	264
H_2	5,300	11,625	265

Fig. 6—(Below) Interior of two-unit booster plant. These compressors are driven by 225-hp. engines which operate on natural gas. Maximum discharge pressure of compressors is 5,000 lb. Both units are equipped with temperature recorder controllers which automatically shut down engine if temperature of compressor rod packing reaches 275° F. In case of leakage in packing or lubrication failure unit is shut down before damage occurs to rod

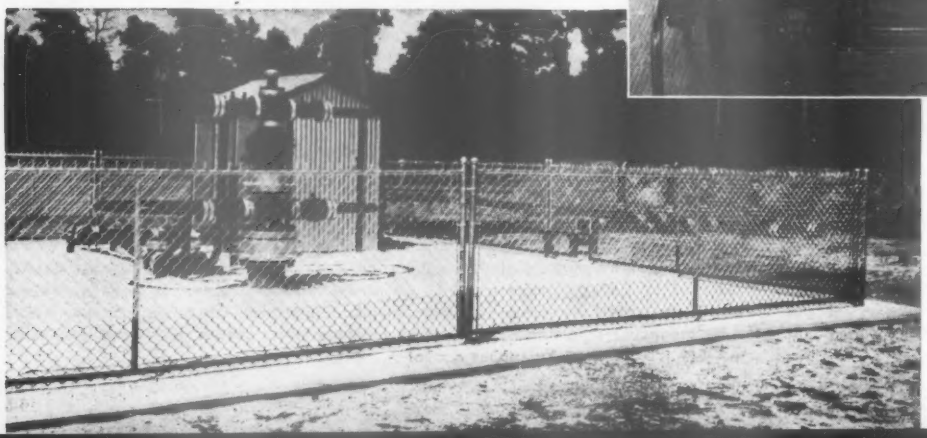


Fig. 7—(Left) Typical Superior well installation in Lake Creek field. In both design and trimness, these layouts rank with the best in the Greater Coastal area

Determining Weighted Average Bottom-Hole Pressure in East Texas Field

*by L. J. Meyer**

THE bottom-hole pressure in the East Texas field is determined monthly on 100 key wells geologically located throughout the field so as to provide suitable pressure control. Key wells, isobars, and weighted average bottom-hole pressure as of July 1, 1945, are illustrated in Fig. 1. Substitutions are made for key wells as such key wells are produced by artificial means because the Texas Railroad Commission utilizes the bomb method of bottom-hole-pressure determination exclusively for purposes of this survey.

The pressure survey extends over a period of 10 days, being divided so that a portion of the pressures are run during the latter part of the month and the remaining portion of the pressures during the first few days of the following month. All pressures are then extrapolated or interpolated to the first day of the month.

The individual well bottom-hole pressures are determined at the individual maximum test depths. No intervening stops are made during the running of the bomb.

The bottom-hole-pressure bombs are calibrated at the average reservoir temperature of 145° F., thereby eliminating temperature corrections.

Procedure

1. A calibration curve may be drawn on 10 × 10 = 1 in. cross-section paper, plotting spring extension as the vertical component using a scale of 1.0 in. on the cross-section paper equal to 0.05 in. of spring extension, versus pressure as the horizontal component using a scale of 1.0 in. on the cross-section paper equal to 5 psi. pressure.

2. As an alternate to (1) above, the bottom-hole pressure may be calculated from the analytic geometrical equation of a straight line, Equation A. Fig. 2 is an illustration relative to this derivation.

Derivation of the equation is:

Required:

To find the value of X.

X and Y are components of point P.

Let:

Y axis equal spring extension.

X axis equal pressure in psi.

$$\frac{Y - Y_2}{X - X_2} = \frac{Y_2 - Y_1}{X_2 - X_1}$$

$$Y - Y_2 = \left(\frac{Y_2 - Y_1}{X_2 - X_1}\right)(X - X_2)$$

$$Y = Y_2 + \left(\frac{Y_2 - Y_1}{X_2 - X_1}\right)(X - X_2)$$

Run No. 1			Run No. 2			Average	
Press. (psi.)	Extension (in.)	Diff. (in.)	Press. (psi.)	Extension (in.)	Diff. (in.)	Extension (in.)	Diff. (in.)
250	0.461	....	250	0.464	....	0.463	....
500	0.975	0.514	500	0.978	0.524	0.977	0.514
750	1.489	0.514	750	1.492	0.514	1.491	0.514
1,000	2.001	0.512	1,000	2.008	0.516	2.005	0.514
1,250	2.515	0.514	1,250	2.524	0.516	2.519	0.514
1,500	3.028	0.513	1,500	3.038	0.514	3.033	0.514

$$X = X_2 + \left(\frac{X_2 - X_1}{Y_2 - Y_1}\right)(Y - Y_2)$$

Let: $X_2 - X_1 = \Delta X$

$Y_2 - Y_1 = \Delta Y$

$$X = X_2 + \frac{\Delta X}{\Delta Y}(Y - Y_2)$$

$$X = X_2 + \frac{\Delta X}{\Delta Y}Y - \frac{\Delta X}{\Delta Y}Y_2$$

$$X = \frac{\Delta X}{\Delta Y}Y + \left(X_2 - \frac{\Delta X}{\Delta Y}Y_2\right)$$

Equation A

Note: $\left(X_2 - \frac{\Delta X}{\Delta Y}Y_2\right)$

Trend of reservoir pressure with production is a very important relationship in any pool. Because of the large area, number of wells, and reserve of the East Texas field, probably more bottom-hole-pressure tests and interpretative studies of pressure data have been made there than in any other single field. Herein is presented the detailed procedure for the determination of the weighted average bottom-hole pressure of the East Texas field as conducted by the engineering department, Oil and Gas Division of the Railroad Commission of Texas.

Equation B = initial tension of the spring = point at which the curve extended intersects the X axis.

Hypothetical Example

For purposes of illustrating usage of Equation A, data from two calibrations will be assumed. It is emphasized that such data are assumed for illustrative purposes only.

Average difference =

$$\frac{0.514 + 0.514 + 0.512 + 0.514 + 0.513 + 0.514 + 0.514 + 0.516 + 0.516 + 0.514}{10}$$

$$= 0.514 \text{ in.}$$

$$X = \frac{\Delta X}{\Delta Y}Y + \left(X_2 - \frac{\Delta X}{\Delta Y}Y_2\right)$$

Equation A

Let: $X_2 = 1{,}000$ lb., $Y_2 = 2.005$ in.
$X_1 = 500$ lb., $Y_1 = 0.977$ in.

$\Delta X = X_2 - X_1 = 1{,}000 - 500 = 500$ lb.

$\Delta Y = Y_2 - Y_1 = 2.005 - 0.977 = 1.028$ in.

$$X = \frac{500}{1.028}Y + \left(1{,}000 - \frac{500}{1.028}2.005\right)$$

$$= 486.38\,Y + (1{,}000 - 975) =$$

$$X = 486.38\,Y + 25 \text{ lb.}$$

Equation A′ for the above assumed data.

25 psi. is the initial tension of the spring corresponding to the above assumed data.

To find the pressure (X) for a certain spring extension (Y), substitute the value of Y in inches in Equation A′ and solve for X for the above assumed conditions.

3. The bottom-hole-pressure datum plane adopted by the engineering department of the commission

*Senior engineer, Railroad Commission, Oil and Gas Division, Austin, Tex.

XUM

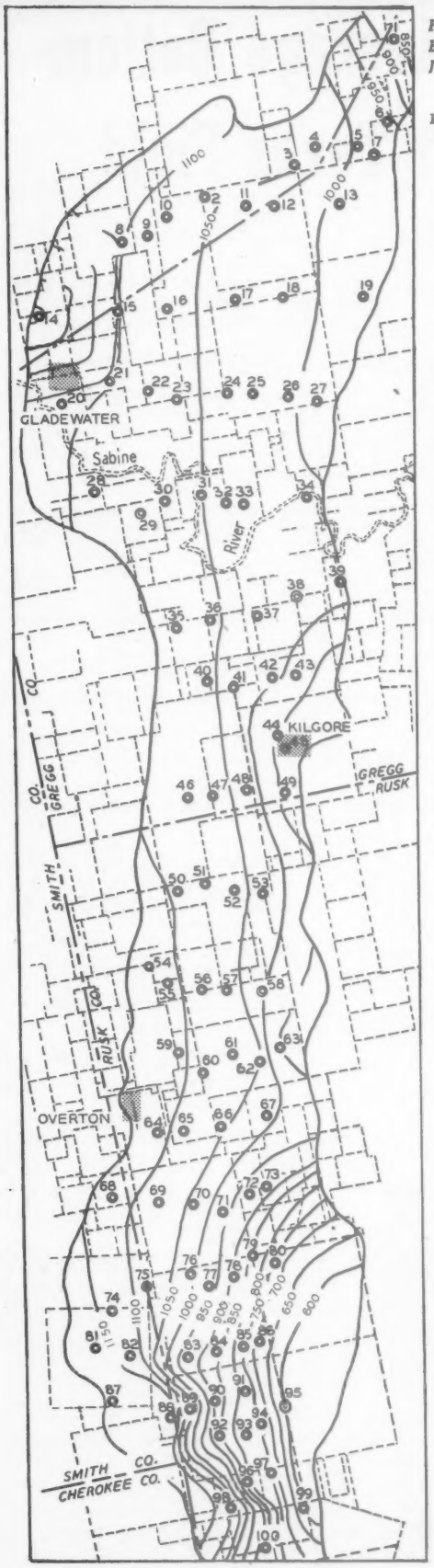


Fig. 1—Isobaric map of the East Texas field as of July July 1, 1945

Key No.	Operator, lease and well—	Table 1—Well data and constant additive corrections to resolve bomb readings to 3,300-ft. subsea datum: Elev. in ft.	Test depth (ft.)	Con. add. (psi.)	Test date	Table 2—Bottom-hole pressure results for July 1, 1945: Pr. at —3,300	Est. 7-1-45
	First day:						
1	Humble 7 Mackey	335	3,600	12	7- 9	861	860
2	Shell 6 Landers	443	3,700	14	6-27	1,060	1,061
3	Olvey, Mucher & Sample B-1 Collins	372	3,585	29	6-27	1,057	1,057
4	Tide Water B-37 Flewellen	453	3,700	18	6-27	1,016	1,016
5	Humble 1 Wells	464	3,700	21	6-27	998	999
6	Sun 1 Sparks	398	3,630	22	6-27	952	952
7	Sun 1 Fuller	433	3,655	26	6-27	992	992
10	Humble B-1 O'Byrne	382	3,600	27	6-27	1,079	1,080
11	Atlantic 3 Porter	416	3,600	38	6-27	1,036	1,036
12	Magnolia 14 Free	346	3,575	23	6-27	1,023	1,023
	Second day:						
8	Humble 2 Mattox	396	3,650	15	6-28	1,102	1,102
9	Atlantic 7 Walker	365	3,600	22	6-28	1,089	1,090
13	Humble 49 W. R. Hughes	417	3,636	27	6-28	992	992
14	Stanolind B-1 Everett	393	3,650	14	6-28	941	940
15	Humble 6 Holland	335	3,550	28	6-28	1,100	1,101
16	Humble 6 Carter	382	3,600	27	6-28	1,064	1,064
17	Amerada 1 Willingsworth	380	3,575	35	6-28	1,033	1,033
18	Sun 1 Tate	318	3,515	34	6-28	1,016	1,016
19	Tide Water 2 Lathrop	436	3,610	42	6-28	982	982
27	Amerada 3 Hearne	346	3,490	52	6-28	982	981
	Third day:						
20	Stanolind A-1 Walker	291	3,550	14	6-29	1,124	1,124
21	Cities Service 3 L. A. Jeter	321	3,540	27	6-29	1,101	1,102
22	Sun 5 Haynes	354	3,550	34	6-29	1,075	1,075
23	Amerada 2 Sheppard	337	3,560	25	6-29	1,062	1,062
24	Sinclair Prairie A-4 Akin	353	3,550	34	6-29	1,038	1,039
25	Cities Service 1 Akin	401	3,608	31	6-29	1,024	1,024
26	Cities Service 6 Bumpus	333	3,520	37	6-29	1,010	1,011
28	Cities Service 11 Walker	355	3,655	0	6-29	1,057	1,057
29	Sinclair Prairie 55 M. T. Cole	328	3,600	9	6-29	1,072	1,072
30	Gulf 2 M. T. Cole	270	3,475	31	6-29	1,057	1,057
45	Calstar B-3 Crim	370	3,515	51	7- 2	818	817
	Fourth day:						
31	Atlantic 3 Moore	275	3,525	17	6-30	1,049	1,049
32	Gulf 3 Judge	276	3,490	28	7- 9	1,046	1,044
33	Atlantic B-1 Burnside	279	3,510	23	6-30	1,028	1,028
34	Sinclair Prairie B-3 King Tract	267	3,400	55	6-30	1,008	1,008
35	Gralenor 2 King	372	3,340	110	6-30	1,055	1,055
36	Tide Water 1 Strong	398	3,650	16	6-30	1,056	1,056
37	Gulf A-18 Hilburn	334	3,550	28	6-30	1,036	1,036
38	Arkansas 1 Hughey-Ross	308	3,450	52	6-30	1,011	1,011
39	John W. Russell 6 Lacy	320	3,425	64	6-30	1,005	1,005
40	Gulf C-21 Hilburn	401	3,675	9	6-30	1,058	1,058
	Fifth day:						
41	Tide Water 1 Barton	354	3,610	15	7- 9	1,033	1,033
42	Amerada 1 Jenkins	284	3,520	21	7- 2	1,011	1,011
43	Gulf 9 Culver	294	3,475	39	7- 2	991	991
44	Humble 4 Thomas	361	3,541	40	7- 2	946	946
46	Gulf 5 J. S. King	312	3,540	24	7- 2	1,079	1,079
47	Shell 13 Watson	328	3,550	26	7- 2	1,070	1,070
48	Shell 3 Watson	371	3,570	33	7- 2	1,035	1,035
49	Humble B-69 S. S. Laird	387	3,545	47	7- 2	934	934
52	Humble 29 Crim	450	3,600	50	7- 2	1,066	1,066
53	Shell A-4 Wells	477	3,650	42	7- 2	1,032	1,032
	Sixth day:						
50	Stanolind 4 Terrell	354	3,600	18	7- 3	1,096	1,096
51	Humble 81 Crim	367	3,600	22	7- 3	1,085	1,085
54	Stanolind 3 Rena Christian	373	3,600	24	7- 3	1,118	1,118
55	Gulf 5 Florence	387	3,600	29	7- 3	1,104	1,103
56	Gulf C-13 Christian	492	3,700	30	7- 3	1,094	1,094
57	Magnolia 6 Leverett	486	3,676	36	7- 3	1,085	1,085
58	Gulf 1 Sexton Estate	475	3,650	41	7- 3	1,007	1,007
59	Humble 1 Fuller	384	3,575	36	7- 3	1,106	1,105
60	Humble 6 London State Land	492	3,700	30	7- 3	1,089	1,089
61	Humble 5 Geurin	536	3,746	30	7- 3	1,079	1,079
	Seventh day:						
62	Humble 4 Cameron	480	3,600	59	7- 4	1,060	1,059
63	Humble 1 C. W. Wilson	448	3,600	49	7- 4	948	945
64	Gulf 6 Cashen	484	3,720	21	7- 4	1,105	1,104
65	Stanolind 3 O'Quinn	527	3,757	23	7- 3	1,091	1,091
66	Humble 9 Barton	522	3,690	44	7- 4	1,051	1,052
67	Humble 1 J. White	535	3,700	45	7- 4	1,027	1,027
68	Magnolia 7 Tyiska	497	3,730	22	7- 4	1,113	1,112
69	Humble 2 W. Shaw	460	3,730	10	7- 4	1,082	1,082
70	Gulf 3 Maxwell	518	3,768	17	7- 4	1,041	1,040
71	Gulf 19 E. E. Thrash	547	3,700	49	7- 4	971	970
	Eighth day:						
72	Tide Water 1 Shaw	500	3,730	23	7- 5	900	901
73	Tide Water A-12 Thompson	489	3,650	46	7- 5	911	910
74	Sinclair Prairie 6 Dora Wright	397	3,595	34	7- 5	1,138	1,137
75	J. D. Davis, Agt. 1 Fox	410	3,475	78		(No test)	
76	Humble 47 A. D. Blackwell	420	3,600	40	7- 9	1,011	1,007
77	Humble 24 C. J. Thompson	465	3,625	46	7- 5	979	978
78	Magnolia B-2 Pool	507	3,707	33	7- 5	884	883
79	Tide Water A-2 Finney	451	3,600	50	7- 5	854	853
80	Shell 2 William Jobe	434	3,654	26	7- 5	753	752
82	Wheless & Nelms, Inc. 12 Smith	392	3,600	30	7- 5	1,138	1,136
	Ninth day:						
81	Gerver Oil Co. 1 Pace	471	3,700	23	7- 6	*1,164	1,164
83	Atlantic 15 Fair	349	3,480	56	7- 6	923	921
84	Atlantic A-11 Pinkston	441	3,640	33	7- 6	*875	875
85	Ohio 28 S. H. Moores	451	3,675	25	7- 6	760	761
86	Magnolia 3 Season	512	3,682	43	7- 6	676	675
87	Sinclair Prairie 2 Patterson	390	3,600	30	7- 6	*1,192	1,190
88	Humble 10 M. C. Thompson	336	3,575	21	7- 6	*1,188	1,187

(Continued on page 71)

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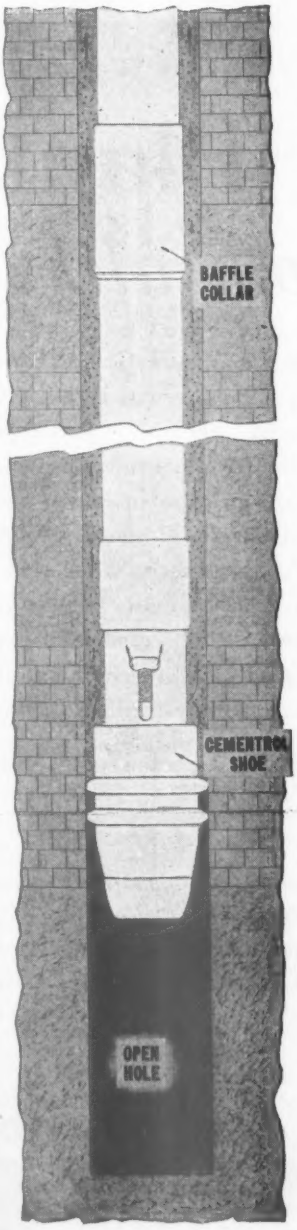

For various reasons it is often desirable to drill considerable hole below the point at which casing is to be cemented. Even though the upper strata which is to be cased off is of such character as to resist penetration and contamination by cement it has frequently been found that some lower exposed formation will, under the hydrostatic head created by the cement column, "take" the water or mud necessarily left in the open hole below the casing and allow downward movement of cement below the casing seat.

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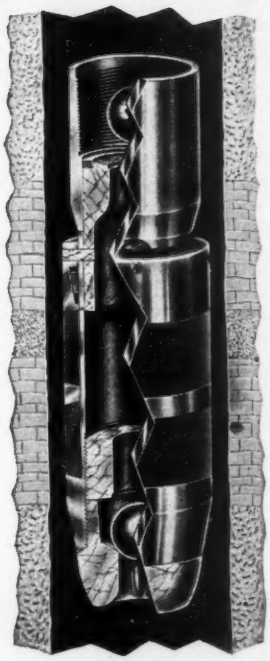
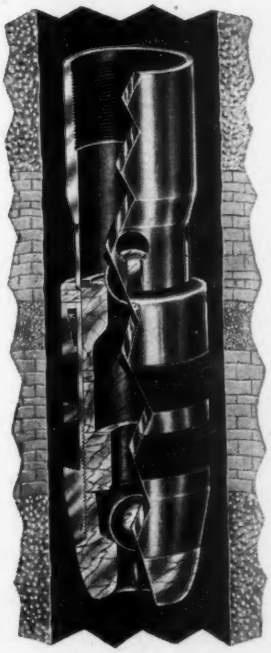


Running-in position



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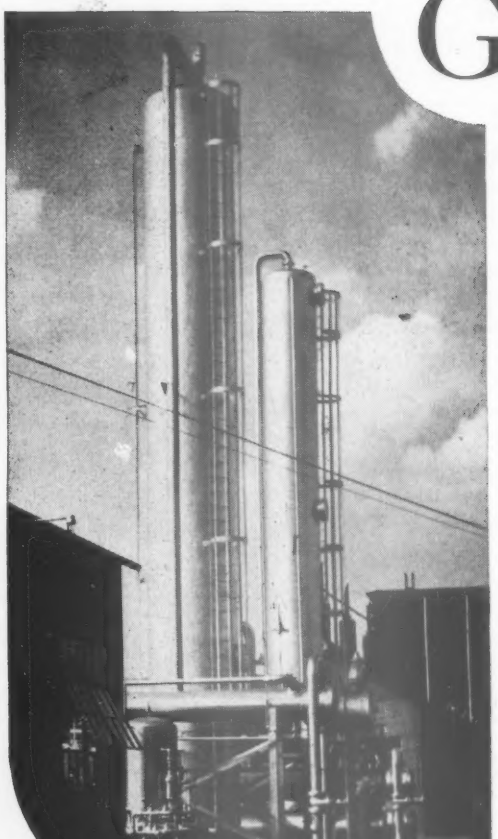

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(Continued from Preceding Page)

Table 1—Well data and constant additive corrections to resolve bomb readings to 3,300-ft. subsea datum

Table 2—Bottom-hole pressure results for July 1, 1945

Key No.	Operator, lease and well—	Elev. in ft.	Test depth (ft.)	Con. add. (psi.)	Test date	Pr. at —3,300	Est. 7-1-45
89	Sinclair Prairie 51 Kinney	357	3,600	19	7- 6	*1,119	1,118
90	Ohio 1 DeGuerin	382	3,600	27	7- 6	*885	884
91	Ohio 12 E. E. Moores	375	3,600	25	7- 6	781	782
	Tenth day:						
92	Gulf D-3 Mayfield Co.	375	3,600	25	7- 7	838	836
93	Magnolia 5 Flanagan	392	3,620	24	7- 7	772	774
94	Magnolia 18 Mason	404	3,600	34	7- 7	765	763
95	Atlantic A-1 Strickland	382	3,500	60	7- 7	602	600
96	Ohio 15 Burton	418	3,660	19	7- 7	798	795
97	Stanolind 6 Burton	367	3,650	6	7- 7	750	749
98	Ohio 61 Grissom	375	3,610	22	7- 7	1,115	1,114
99	Stanolind 74 Siler	393	3,630	21	7- 7	597	595
100	Texas 7 Henry	321	3,590	10	7- 7	863	863

*On these wells bomb No. 28 was used, on the remainder No. 38 was used.

for the East Texas field is 3,300 ft. subsea.

4. All pressures are corrected to this datum plane using the previously determined oil gradient for this field which was determined to be 0.33 psi. per foot of depth. The test depths on the key wells are constant for each survey; therefore, the additive corrections to resolve these pressures to the datum plane are constant. Table 1 presents the following information: key number, operator, lease and well, elevation in feet, test depth in feet, additive constant in psi.

Actual example:

Amerada Petroleum Corp. 3 Hearne well:

Datum plane = 3,300 ft. subsea.

Elevation of well = 346 ft. above sea level.

Bomb test depth = 3,490 ft.

b.h.p. at test depth = 930 psi. on June 28, 1945.

3,300 ft. + 346 ft. = 3,646 ft., distance from surface of ground to the datum plane.

3,646 ft. — 3,490 ft. = 156 ft. to correct down to datum plane.

Therefore, additive correction for this well = 156 ft. × 0.33 psi./ft. = 51.48 = 52 psi., since individual corrections are recorded to the nearest significant whole number.

Therefore, the pressure on the above-mentioned well corrected to 3,300 ft. subsea datum = 930 + 52 = 982 psi. on June 28, 1945.

5. The estimated bottom-hole pressure for the first day of the month is determined by obtaining the difference (either decreasing or increasing) between the preceding b.h.p. and the newly determined b.h.p., and then knowing the interval of time in days between the two bottom-hole pressures, the increment of pounds per day loss (or gain) may be determined. By using this increment the newly determined b.h.p. may be extrapolated (or interpolated) to the first day of the month.

Actual example:

Amerada Petroleum Corp. 3 Hearne well.

Previous b.h.p.: 991 psi. at 3,300 ft. subsea on May 29, 1945.

Newly determined b.h.p.: 982 psi. at 3,300 ft. subsea on June 28, 1945.

991 — 982 = 9 psi. decrease from previous b.h.p. of May 29, 1945.

Calendar days from May 29, 1945 to June 28, 1945 = 30 days.

Increment of decrease = 9 psi. per 30 days = 9 psi./30 days = 0.3 psi./day decrease.

Therefore the b.h.p. of the above well extrapolated to July 1, 1945 = 982 — 0.3 × 4 days = 980.8 = 981 psi., since individual pressures are recorded to the nearest significant whole number.

6. If the newly determined bottom-hole pressure corrected to the datum plane differs from the previous bottom-hole pressure corrected to the datum plane by an amount in excess of a plus or minus 10 psi., the commission's engineer in charge of the survey will decide whether or not such well or wells should be rescheduled for bottom-hole-pressure tests during that survey.

7. A check bottom-hole-pressure test should be run every 2 days using a standby bomb to determine the accuracy of the working-bomb readings. These two pressures (on the same well) should check within 6 psi. of each other. Wells on which check pressures are to be run should be selected so as to obtain as much variance in pressure range of the field as practicable.

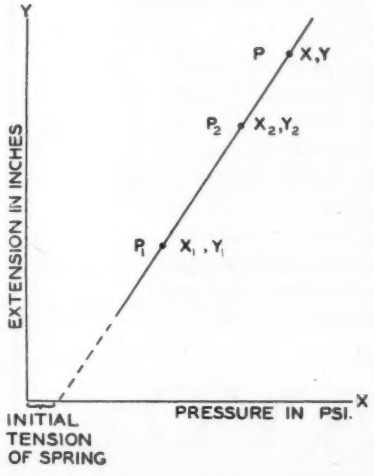

Fig. 2—Analytical graph of a straight line. Given: Points P_1 and P_2
Components of P_1 being X_1 and Y_1
Components of P_2 being X_2 and Y_2

8. The bottom-hole-pressure data are tabulated as in Table 2. This table indicates the date of the bottom-hole pressure, the key well number, the operator, the lease, the well number, the bottom-hole-pressure bomb number, the pressure at 3,300 ft. subsea datum and the pressure at datum extrapolated (or interpolated) to the first day of the month.

9. A sepia tone (brown line) print is made of the base field map. The pressures of the respective key wells are plotted and the contours are drawn on this brown line print. The contour interval selected for this isobaric map is 50 psi.

Triangulation is used as a means of control. The graphical method is used to determine the location of contours between wells. Cross-section paper of 10 × 10 = 1 in. is used for the graphical determinations; the vertical axis being pressure to the scale of 1 in. on the graph equals 50 psi., and the horizontal axis being measured distance between wells to the scale of 1 in. on the graph equals ½ in. of measured distance. The starting point of a certain pressure and zero distance is plotted on the graph, the pressure and the measured distance from the starting point (or well) to the next point (or well) between which contour control is to be established. A straight edge is aligned with these two points and the intervening 50 psi. intervals are projected to the horizontal axis from the points of intersection with the line connecting the two plotted points. These respective horizontal axis intersections are the locations of such contour intervals between the two points measured from the starting point (or well). The contours are first sketched in pencil and are then drawn in india ink on the brown line print.

10. The field is divided into three areas for ease in planimetering as follows:

The northern extremity of the field is taken to be a projection of the south line of the R. L. Clawer Survey and the south line of the B. Holloway Survey across the map.

The southern extremity of the field is taken to be a projection across the map of a line joining the southwest corner of the J. H. Sparks survey and the northeast corner of the W. Christian Survey.

The line between P_1 and P_2 (where P_1 and P_2 refer to the respective planimeter areas) is taken as a projection across the map of the north line of the I. Baty Survey and the north line of the Mary Scott survey.

The line between P_2 and P_3 is

TABLE 3—WEIGHTED BOTTOM-HOLE-PRESSURE WORK SHEET, JULY 1, 1945

Contour int. (lb.)—	P_1	P_1	P_2	P_3	P_3	Total P.	Av. Pr.	Exten.
Below 600	..	..	..	..	564	564	575	324,300
600- 650	..	..	..	..	267	267	625	166,873
650- 700	..	..	..	..	276	276	675	186,300
700- 750	..	..	..	..	206	206	725	149,350
750- 800	..	..	..	..	288	288	775	223,200
800- 850	115	..	..	..	273	388	825	320,100
850- 900	142	..	..	..	282	424	875	371,000
900- 950	118	..	288	138	386	930	925	860,250
950-1,000	1,030	104	663	..	470	2,267	975	2,210,325
1,000-1,050	2,279	223	1,147	..	450	4,099	1,025	4,201,475
1,050-1,100	2,193	327	2,448	..	666	5,634	1,075	6,056,550
1,101-1,150	348	..	..	..	..	348	1,125	391,500
1,101-1,124	321	..	..	..	..	321	1,113	357,273
940- 950	9	..	..	..	..	9	945	8,505
1,100-1,150	..	..	585	..	638	1,223	1,125	1,375,875
1,150-1,190	..	..	..	..	653	653	1,170	764,010
						17,899		17,966,888

Weighted average pressure = 1,003.79 psi. Change from previous survey = +5.52 psi.

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taken as projection across the map of the north line of the A. Miller Survey, the north line of the J. M. Scott Survey, and the north line of the A. Melton Survey.

11. The area contained within each contour interval is planimetered and recorded on the weighted bottom-hole pressure work sheet. Table 3 of this report is an example of this work sheet. An average of three planimeter readings, where each of the readings check each other, is recorded on the work sheet as the planimetered area of that particular segment. The pressure for such segment is the average pressure between the two contours.

The weighted average pressure for the entire East Texas field is calculated from the individual segments in the customary manner of calculating weighted averages. This can be shown by the following equation:

Weighted average bottom-hole pressure for East Texas field =

$$\frac{A_a P_a + A_b P_b + A_c P_c + A_d P_d \ldots A_n P_n}{A_a + A_b + A_c + A_d \ldots A_n}$$

Equation C

where:

A is the area of an individual segment

P is the average b.h.p. of that individual segment

therefore:

the numerator of Equation C is the summation of the product of the area and the pressure of each segment; and the denominator of Equation C is the summation of the areas of each of these segments.

12. A film negative is made from the completed and approved brown-line print. Blue-line copies are then produced from this film negative.

A comparative picture of the weighted average bottom-hole pressure of the East Texas field as well as other pertinent conclusions deduced from such data may be obtained each month, since such data are obtained and utilized in accordance with the procedure as set out in this report.

Comparison of monthly bottom-hole pressures on individual wells in certain regions of the field is a definite criterion of salt water encroachment, as well as the relationship between withdrawals from and injections to the reservoir.

Acknowledgments

Grateful acknowledgment is made to Chairman Olin Culberson, Col. Ernest O. Thompson and Beauford H. Jester, commissioners of the Railroad Commission of Texas, for permission to prepare and publish this report; to Jack K. Baumel, director of production, and Clark Lloyd, chief enforcement officer, Oil and Gas Division of the Railroad Commission of Texas respectively, for valuable suggestions and criticisms.

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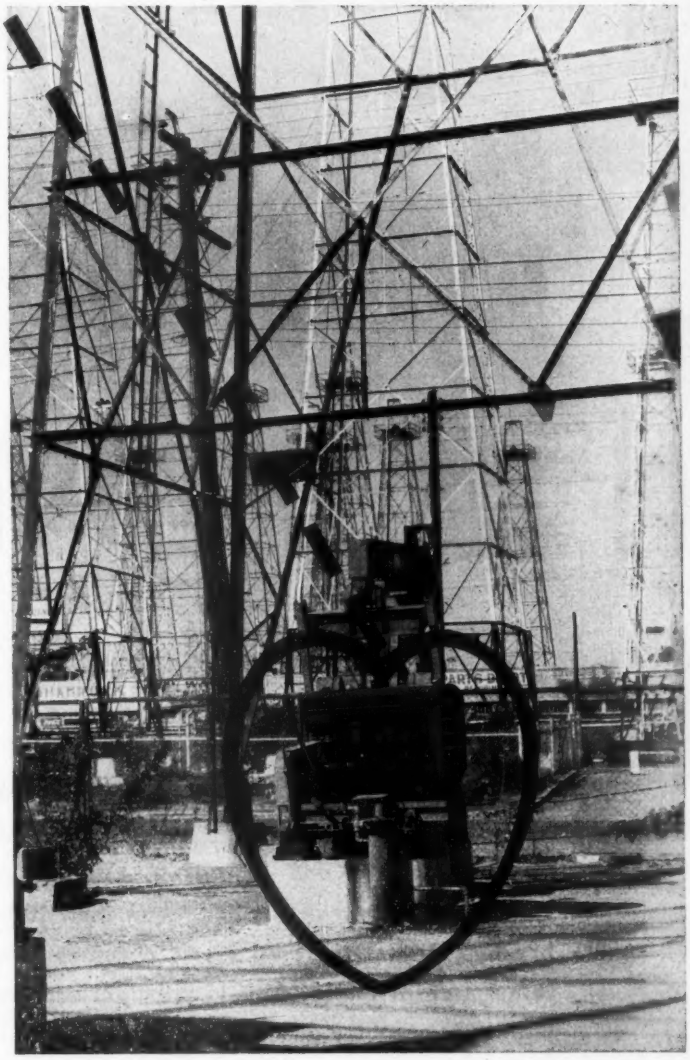

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Treating Water for Disposal Wells

Will you please advise us regarding the literature and methods used in treating refinery waste water for disposal wells? The water contains alkaline sulfides, etc., from the crude-oil desalters and caustic liquors from mercaptan scrubbing processes.—C.W.B.

UNFORTUNATELY the extensive literature on water treating or conditioning for injection into disposal wells is based almost entirely on oil-field brines or on water flooding rather than refinery wastes. Although a system could be proposed here that would almost certainly do the job, such a system would probably be more elaborate and expensive than necessary. The extent of treatment undertaken would be dependent on the behavior of the particular waste water and its behavior with respect to air agitation, evaporation, settling, etc., should be determined in the laboratory or in small-scale plant operations. Possibly an aeration, perhaps while hot, followed by filtration through sand filters will be all that is required, although the tendency to corrode the injection tubing will probably have to be met either by the use of cement-lined pipe or adjustment of the pH of the waste water. References 1-9 are thought to be particularly useful because they disclose mechanical details or treatment of important phases of water treatment whereas the last references (10-13) are of a general nature.

This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in various phases of plant operation, as well as those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Inquiries must be signed, but only the initials will be printed.

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Vapor Line Back Pressures

In your issue of March 30, 1944, you show charts of pressure drop in refinery vapor lines. Can you give us a simple formula for the job something similar to the formula by R. G. Lovell in Petroleum Engineer?—C.M.P.

THE matter of pressure drop can never be simple whether it be for refinery vapors or any other situation because it is dependent on the square of the amount of material and it decreases as the fifth power of the diameter of the pipe. However, the fifth power of diameter is tabulated here so this difficulty is somewhat avoided.

D Nominal pipe size, inches	D^5 Actual diameter to fifth power
3	272
4	1,079
6	8,318
8	28,250
10	107,900
12	248,900

Thus, according to the charts shown on March 30, 1944, on the Questions on Technology page, the formula for pressure drop is:

$$\Delta P = \frac{23.4}{1{,}000{,}000} \times \frac{L^2}{D^5}$$

$$\text{or} = \frac{905}{1{,}000{,}000} \times \frac{G^2}{D^5}$$

in which:

ΔP = pressure drop per 100 ft., psi.
D = inside dia., in.
L = lb. per hr. hot reflux, product and steam
G = G.p.h. hot reflux, product and water.

This formula applies only to gasoline vapor lines operating at conventional topping plant temperatures and pressures.

For other materials than gasoline and for different temperatures or pressures, the formula can be modified as follows: (See The Oil and Gas Journal, page 73, November 4, 1944), in which T is absolute °F., M is mol weight and P is pressure—pounds per square inch absolute.

$$\Delta P = \frac{23.4}{0.4 \times 1{,}000{,}000} \frac{T L^2}{M P D^5}$$

$$= \frac{58.5}{1{,}000{,}000} \times \frac{T L^2}{MPD^5}$$

It is regrettable that pressure drop formulas cannot be simple without spoiling their accuracy.

Water in Gasoline Tank

Our customers are finding water in our gasoline and our supplier says that the gasoline contains no water. How could water be getting into our tank?—A.G.G.

Excluding plain carelessness in delivering water along with the gasoline, there are only three main ways that water could get into the tank:

1. Leaks.

2. From air. Moist warm air carries moisture into the tank as it is being emptied and as the air cools the water condenses mainly as droplets on the roof.

3. Dissolved in gasoline. The solubility of water in gasoline is not large but if the ground temperature is low the accumulation by this common method is relatively large.

These several topics have been discussed on the Questions on Technology page of August 19, 1943, page 66 (Solubility of Water in Oils) and September 2, 1944 (Water in Underground Gasoline Tank). As an indication of the rate of accumulation of water, a 1,000-cu. ft. tank (7,480 gal.) upon cooling from 90° to 50° F. will, by item 2 above, accumulate about 1 lb. of water per filling and by item 3 above will accumulate about 6 lb. of water per filling.

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Fluid Flow

Graphic Solutions of Design Problems

7—Reynolds Number for Gases

by Paul Buthod and B. W. Whiteley

Article 6 of this series which was published in the November 24 issue discusses isothermal and adiabatic flow conditions. Energy and physical changes expressed in mathematical form are employed in the discussion of fluid flow through closed conduits which shows the Darcy equation as giving magnitude of friction loss. A reproduction of Brown's compressibility factor chart accompanies the article.

IN considering the flow of fluids in pipes, it is necessary to define the pressure loss due to friction by means of some equation, which takes into consideration all of the basic variables affecting the flow. In the case of incompressible fluids, this basic equation is the Darcy formula:

$$h_f = \frac{flu^2}{2gd} \qquad (7\text{-}1)$$

This same equation may be written in the differential form, applicable for an infinitely short length of pipe, and as such may be used for the flow of compressible fluids, such as gases; thus:

$$dh_f = \frac{fu^2}{2gd}\,dl \qquad (7\text{-}2)$$

In order to integrate the right-hand side of Equation 2, it is necessary to define the variables "f" and "u" as functions of the distance "l." The velocity "u" may vary considerably along the pipe length, but in most instances it can be shown that the friction factor "f" varies only to a slight degree and for practical purposes is essentially constant.

The friction factor for any type of fluid flow is dependent only upon two dimensionless ratios, the Reynolds number and the relative pipe roughness. The relative roughness is a function only of the size and kind of pipe and consequently for a chosen pipe diameter, "f" is independent of this quantity.

The Reynolds number contains three terms which vary throughout the pipe length. The velocity "u" ordinarily increases along the length of line, due to an increase in gas volume as the pressure becomes smaller. Likewise, the density "ρ" decreases as the pressure decreases along the line. However, for steady-state flow the product "uρ," usually termed the mass velocity, is constant throughout the entire pipe length regardless of any changes in pressure, temperature or thermodynamic flow path. Consequently the only change in the Reynolds number (and hence the friction factor) along the length of the line will be due to a change in fluid viscosity. The viscosity of compressible fluids is affected by changes in temperature and ordinarily to a somewhat smaller degree by changes in pressure.

For isothermal flow the only variation in fluid viscosity is due to changes in pressure, and since for reasonable pressure drops this variation is of a minor nature, the Reynolds number is essentially constant along the length of line. Consequently the Reynolds number and friction factor may be calculated by using data on either the inlet or outlet conditions.

If the fluid flow is not along an isothermal path, a viscosity variation will occur. If the range of temperature is small, an average viscosity may be chosen, which will represent the flow conditions with sufficient accuracy. If a high degree of accuracy is desired, the calculation may be performed by dividing the line into shorter sections so that the friction factor is essentially constant for a particular section. However, this procedure is usually not warranted in practical cases.

Since the friction factor "f" shows only a minor variation along the length of line, it can be treated as a constant in Equation 6-2 thus simplifying the integration.

Thus, the solution of Equation 6-2 depends only on the functional relationship of the gas velocity, pressure and length of line. In general, this relationship can be found when the thermodynamic flow path is defined.

The Reynolds number may be calculated from any of the following formulas, which are sometimes more convenient in the solution of problems involving gases.

$$Re = \frac{du\rho}{\mu'} = 20.15\frac{Qs}{D\mu_p} = 20.15\frac{Q\gamma}{Dz\mu_p} = 1{,}240\frac{DG}{\mu_p}$$

The Reynolds number may be determined directly from Fig. 7-1. This chart is based on the equation:

$$Re = 20.15\frac{Qs}{D\mu_p}$$

and gives the Reynolds number for a flow rate in M.c.f./day (measured at 60° F. and 14.7 psia.), a specified pipe diameter, and the function μ_p/s. This quantity μ_p/s is the absolute viscosity (centipoises) of the gas at flowing conditions divided by the gas specific gravity at standard conditions. Values of this function for hydrocarbon gases at various pressures and temperatures may be obtained from Fig. 7-2. This chart is based on generalized data and agrees with published experimental values within a range of 5 or 10 per cent. If the viscosity of the gas is desired for other purposes, the value obtained from the left-hand side of the chart should be multiplied by the gas specific gravity.

The following examples illustrate the use of the accompanying charts:

Example 1.—A 0.7-specific-gravity natural gas flows through a pipe at a temperature of 80° F. and a pressure of 1,500 psia. Determine the absolute viscosity of the gas at these conditions.

Solution.—Enter the chart (Fig. 7-2) on the bottom scale at a temperature of 80° F. and follow the diagonal guide line to a value of 0.7 for specific gravity. Rise vertically from this point to the curve for 1,500 psi. pressure, thence mov.

XUM'

DECEMBER 1, 1946

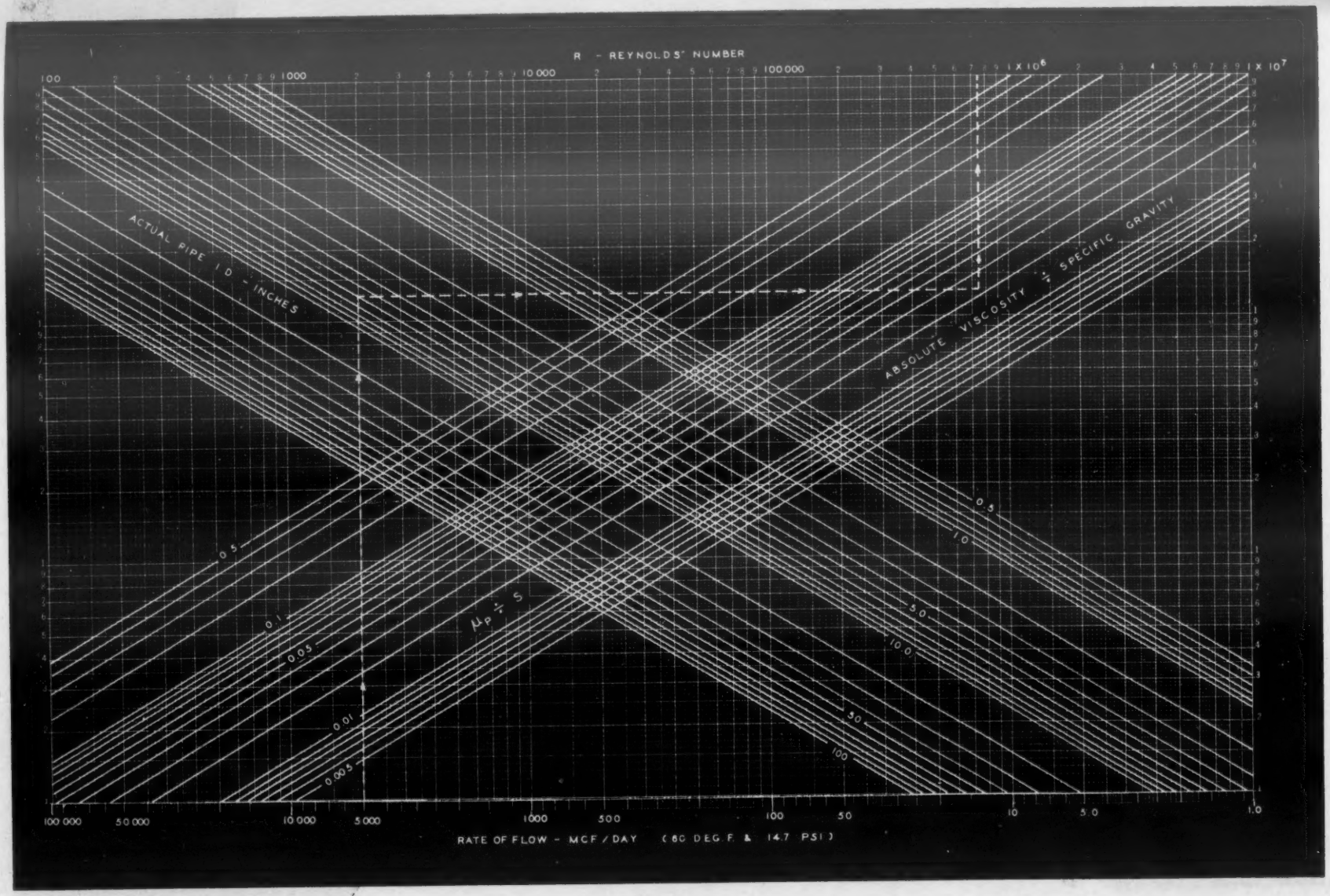
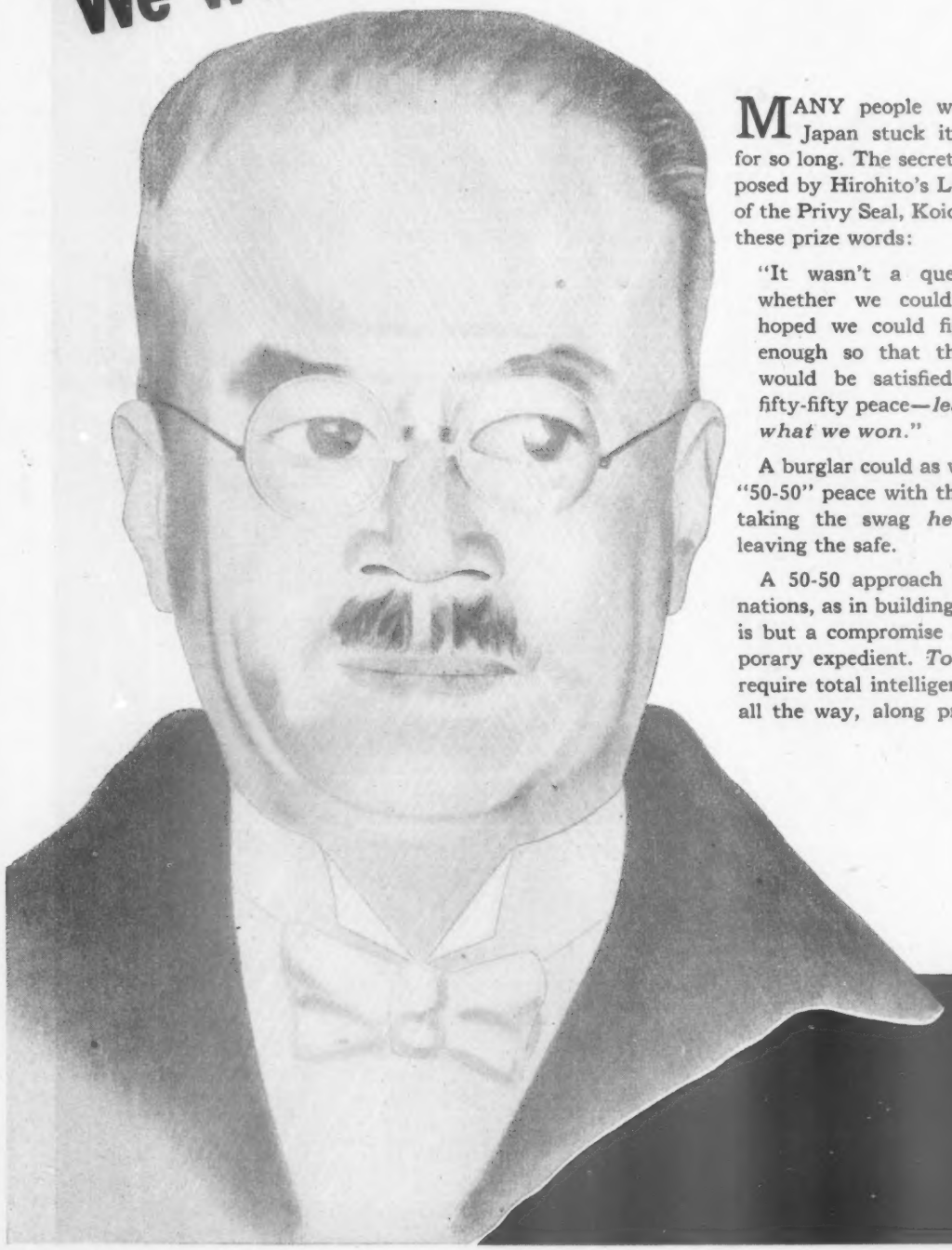


Fig. 7-1

then he said to himself:

"We want a 50-50 Peace on Earth"



MANY people wonder why Japan stuck it out alone for so long. The secret is now exposed by Hirohito's Lord Keeper of the Privy Seal, Koichi Kido, in these prize words:

> "It wasn't a question of whether we could win. I hoped we could fight long enough so that the U. S. would be satisfied with a fifty-fifty peace—*leaving us what we won.*"

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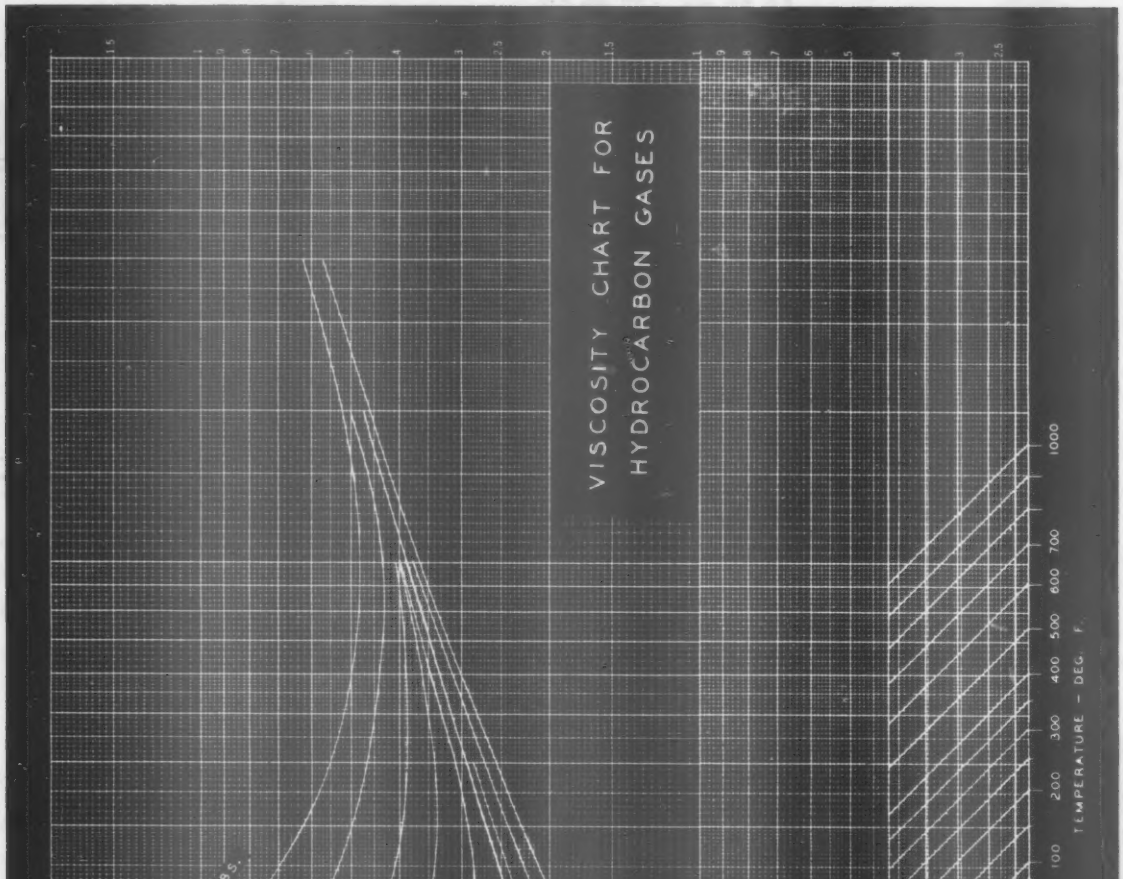

VISCOSITY CHART FOR HYDROCARBON GASES
PRESSURE - PSI ABS.
7 000
5 000
3 000
2 000
1 500
1000
750
500
14.7
TEMPERATURE - DEG. F
0
100
200
300
400
500
600
700
1000
GAS SP. GR.
1.0
0.9
0.8
0.7
0.6
GAS SP. GR.
1.0
0.9
0.8
0.7
0.6
0.15
0.10
0.01
0.006
ABSOLUTE VISCOSITY ÷ SPECIFIC GRAVITY = $\mu_p \div S$

Fig. 7.2

horizontally to the left to the 0.7 specific-gravity line. Then move parallel to the diagonal guide lines and read a value of 0.0225 for μ_p/s.

The viscosity is $0.0225 \times 0.7 = 0.0157$ centipoises.

Example 2.—If the gas in Example 1 is flowing through a 6-in. pipe at the rate of 5,000 M.c.f./day (referred to standard conditions), determine the Reynolds number.

Solution.—Starting on the bottom scale of Fig. 7-1 at a flow rate of 5,000 M.c.f./day (note that this is an inverted scale, i.e., increases from right to left) rise vertically to a pipe diameter of 6 in., then move horizontally to a value of 0.0225 for μ_p/s. From this point rise vertically to the top scale and read a value of 750,000 for the Reynolds number.

The procedure to be followed is indicated by dotted lines on both charts.

Notation:

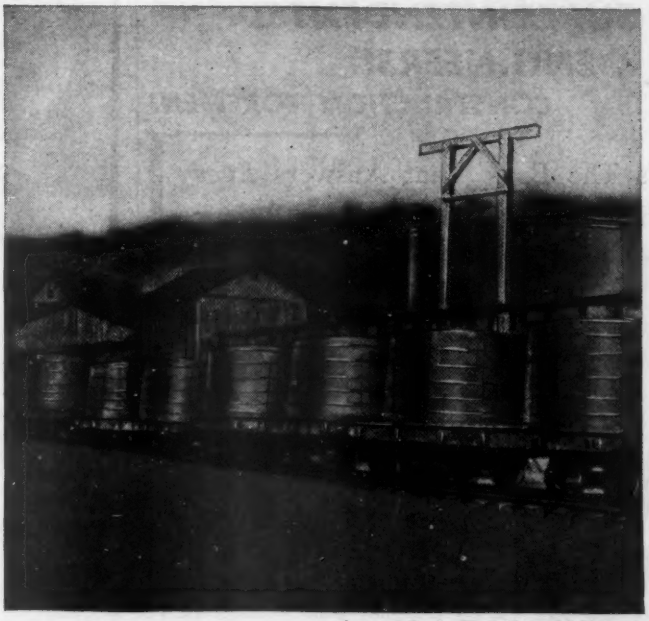
- D = actual i.d. of pipe, in.
- d = actual i.d. of pipe, ft.
- f = friction factor, dimensionless
- G = mass velocity, lb./sq. ft.^{2}-sec.
- g = acceleration due to gravity, ft./sec.^{2}
- H_f = friction loss head, ft.
- l = length of line, ft.
- Q = flow rate, M.c.f./day (60° F. and 14.7 psi.)
- Q_p = flow rate, M.c.f./day (referred to volume at flowing conditions)
- Re = Reynolds number, dimensionless
- s = gas specific gravity (air = 1.000)
- u = linear velocity, ft./sec.
- Z_p = kinematic viscosity at condition of flow, cm.^{2}/sec.
- ρ = density of fluid, lb./ft.^{3}
- μ' = absolute viscosity in English units, lb./ft.-sec.
- μ_p = absolute viscosity in centipoises at conditions of flow, gm./cm.-sec.

References

1. Uyehara, O. A. and Watson, K. M., "A Universal Viscosity Correlation," National Petroleum News, Oct. 4, 1944.
2. Bicher, L. B., Jr., and Katz, D. L., "Viscosity of Natural Gases," Petroleum Technology, A.I.M.E., July 1943.
3. Sage, B. H., and Lacey, W. N., Trans. A.I.M.E. 127, 118 (1938).

Comdr. A. Ernest MacGee, officer in charge of the chemistry section, research and standards branch, of U. S. Navy Bureau of Ships during the war, has returned to Skelly Oil Co. as head of the solvents department.

William J. Crowther, who was senior fire and safety inspector at the Wilmington, Calif., refinery of Shell Oil Co., Inc., has been advanced to department manager. **William H. Croxson** takes Crowther's former position.



Courtesy Drake Well Memorial Museum.

Famous Facts

The first railroad "rotary oil car" used to transport petroleum arrived in Titusville, Pa., on November 1, 1865. Two heavy wooden tubs — sometimes built of iron — were mounted on a railroad flat car. These tanks were similar to those used at the wells and held 40 to 50 bbls. In 1868 an horizontal cylindrical tank, forerunner of today's tank car, replaced the two small wooden ones. This was fitted with a dome to allow the oil to expand without injury to the tank. It had a capacity of 80 to 90 bbls., later increased to 100 bbls., standard for that period.

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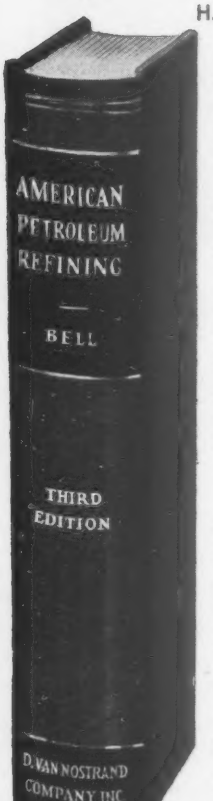
by
H. S. Bell, C.E., Consulting Engineer



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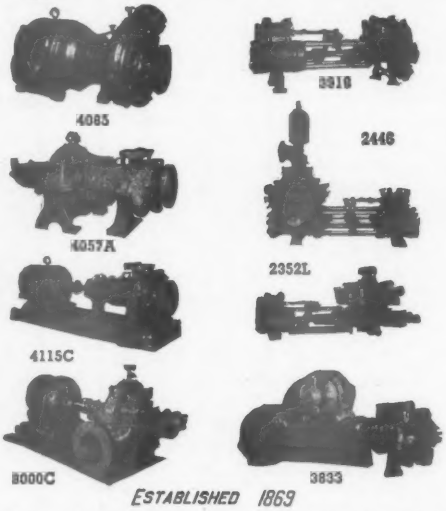

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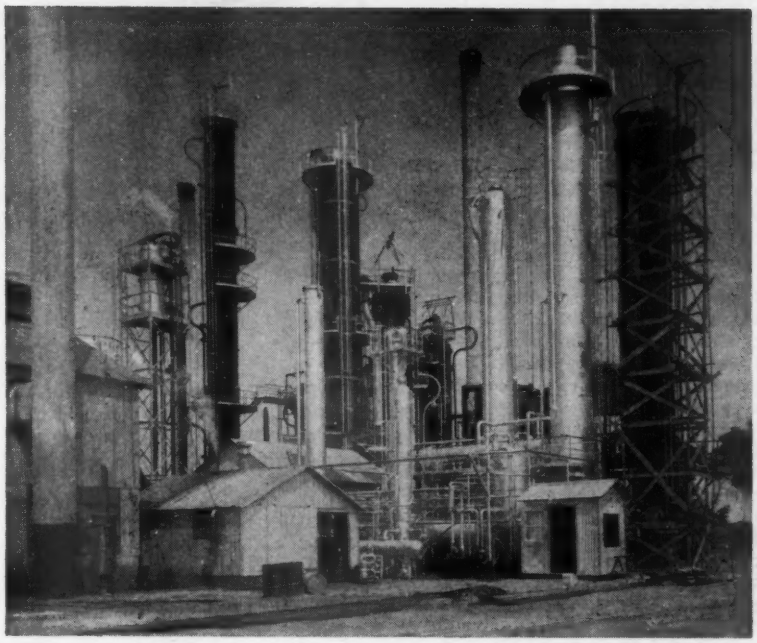
Addition of One Coil Increases Cracker's Efficiency by Two Thirds

by R. B. Tuttle

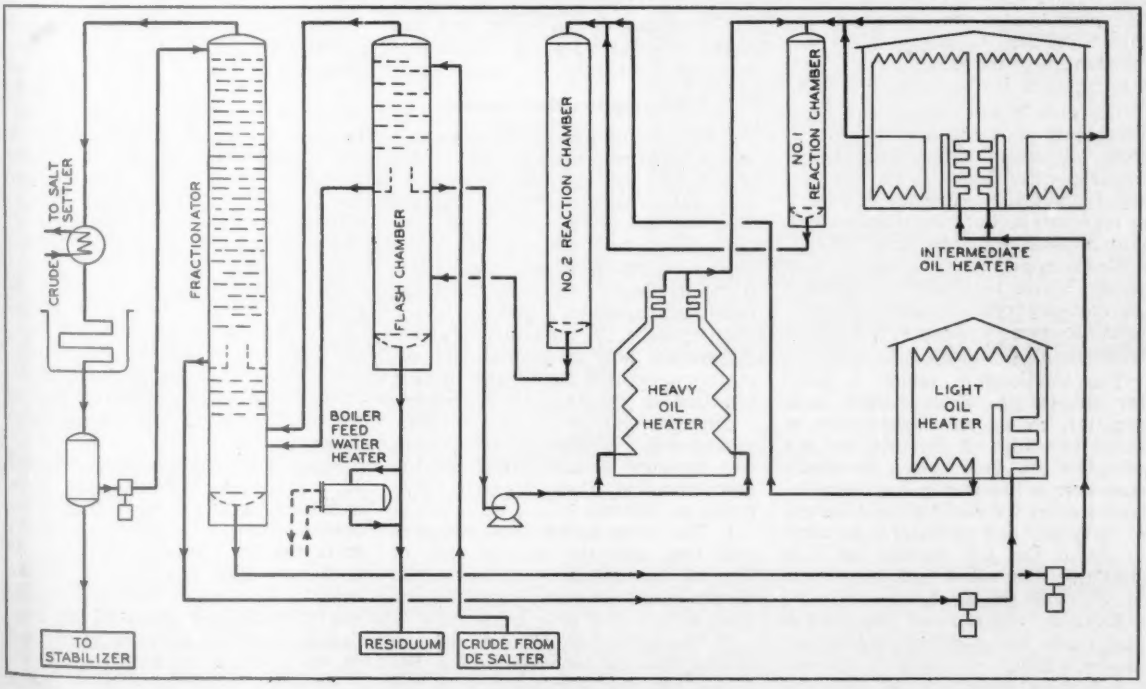
By adding a third heater into a two-heater hookup, the thermal cracker described here, provides a wide range in flexibility. Involving a minimum of alterations, the changeover to current operations makes this plant the second of its type known to be in cracking service.

DESIGNED to handle a wide range of charging stocks, the thermal cracker at Sunray Oil Co.'s Allen, Okla., refinery shows promise of meeting all demands for flexibility. Since the unit was first put on stream, it has been charged with various stock combinations, ranging from 100 per cent crude to 100 per cent cracking stock. Excellent operational stability is shown even when extreme changes are made in the charging stock to the unit.

Construction, which consisted of alterations and additions to an existing two-coil thermal cracker, was started in late 1944. Additions mainly consisted of a parallel two-coil heater, pumping equipment, and the



Stabilizer unit before installation of 28-plate fractionator had been completed



Flow arrangement of three-heater operation

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necessary piping to interconnect these items. The major alterations included the increasing of the fractionator from 6 to 8 ft. in diameter and the rearranging of a few process lines to take care of the changes to flow. The fractionator is identical with the original column except for a 2-ft. diameter increase. Other than the controls for the new heater no additional instruments were required as the original unit was equipped with a sufficient number to handle the job.

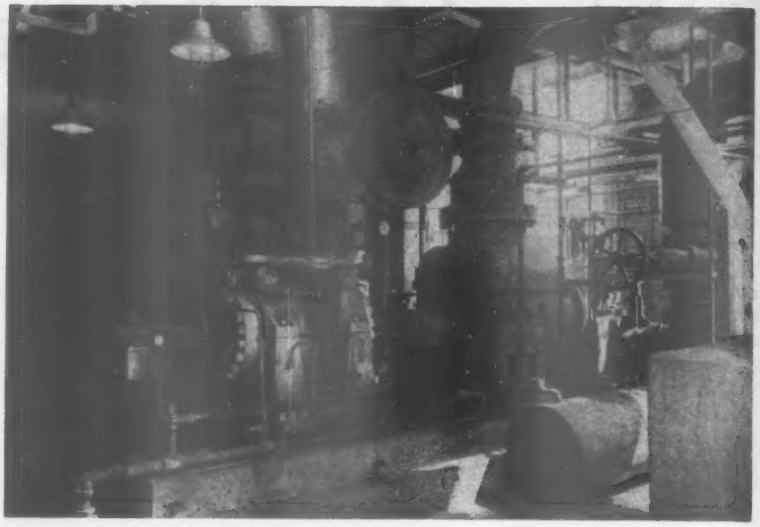
In addition to increased flexibility over the two-coil unit, the three-coil layout provides an increase of about 167 per cent in charging rates. Because of the increase in throughput capacity the larger fractionating column was installed. The arrangement at this particular refinery indicated that a new column connected in parallel with the original fractionator was not desirable; hence a single new and larger fractionator, instead of two smaller columns. Plans have been worked out to use the discarded column elsewhere as it is in good shape and with slight alterations is suitable for various services.

Piping changes and tie-in lines for the new heater and pump ran about 45 per cent of the total job costs with the labor-material figures in the ratio 60 labor and 40 material. This ratio shows the figures for materials to be below the average for work of this type but due to local plant conditions, such as interferences from surrounding structures, because of the compactness of the original layout of the two-coil unit and buried lines in the area where the new heater was installed, the labor cost for the over-all job was substantially increased over usual work of this type.

The new heater, an up-shot type, represents about 22 per cent of the total job costs at the same labor-material ratio figure as for the piping. Layout of the coil for this heater is in two sections for parallel flow with allowance for the installation of a steam generator or a boiler feed water heater coil in the overhead convection section. Separate controls are used for each of the parallel cracking coils.

The fractionator, which is lined for two-thirds of its height with ganister, shows an erected cost of about one-third of the total for the complete job. One vessel, the flash-chamber, is lined with corrosion resisting alloy for about three-quarters of its height and material is on hand to finish the job during the first shutdown that allows sufficient time to carry out the work.

Exhaust steam from the pumps and other steam-driven equipment in the refinery is used to operate the turbine which drives the new pump for the unit. Supplied through the plant's exhaust system at 5 psig. the volume of exhaust steam from other units in the plant is sufficient to operate the turbine without makeup from the high-pressure system. A barometric condenser allows the turbine to exhaust at around 26 in. Hg.



Turbine and charging pump for three-coil cracking unit

In order to meet the power demands of a recently installed forced-draft cooling tower, the refinery's power generating plant has been increased from 250 to 650 kw.; all of the generators are driven with gas engines. Needs for the forced-draft cooling tower were brought about by the increase in throughput at the thermal cracker and by the desire to improve condenser and exchanger efficiencies in other sections of the plant.

Consumption Cut Deeply

Fuel consumption at the refinery's steam plant has been cut to a very low figure by the installation of a feed-water heater at the cracking unit. All feed water for operating the entire plant is supplied to the boilers at 270°-275° F. by the heating unit which is connected into the residuum draw-off line from the flash chamber. A manually adjusted slip-stream hookup permits the operators to control the amount of heat supplied to the feed water heater.

Changeover from the two-coil flow arrangement to the present three-coil hookup, as illustrated in the accompanying flow diagram, was made as follows:

1. The sump in the flash chamber was tied into the suction side of the turbine-driven pump and the discharge of the pump into the parallel coil at the new heater.

2. Discharge from the parallel coil heater was connected into the No. 1 reaction chamber along with the discharge from the original two-coil heater. No change was made in the flow from the original two-coil heater to the No. 1 reactor.

3. Discharge from the single-coil heater which originally was tied into the No. 1 reaction chamber along with the discharge from the original two-coil heater was changed to connect into the top of No. 2 reactor.

Under the two-coil flow arrangement the single-coil heater served to handle light-oil cracking stocks and the second heater the heavy stocks. Heavy-stock gravities for the two-coil hookup ran around 19° A.P.I. and for the light stock averaged 27° A.P.I.

Gravities of the currently charged stocks average 30°-31° A.P.I. to the light-oil heater, 27° to the coil of the intermediate oil heater and 21.5° to the heavy-stock coil. Normal temperatures and pressures under which the three coils operate now are shown to be 1,020° F. and 500 psi. for the light-oil heater, 920° F. and 500 psi. for the intermediate coil, and 905° F. at 600 psi. for the heavy-stock heater.

Pressures for the two-coil operation varied little from the averages shown in current operations. Vessel pressures as the unit is operated now are given as an average of 300 psi. at No. 1 reaction chamber; 250 at No. 2; 105 at the flash chamber and 60 at the fractionator.

Sizes of the vessels which operate at the higher pressures are 3 ft. diameter by 25 ft. for the first reaction chamber; 6 ft. diameter by 42 ft. for No. 2 reactor; and 8 by 46 ft. for the flash chamber. All of the vessels in the main part of the process, with the exception of the fractionator, are the same as were used in the two-coil hookup.

Throughput averages for a 22-day operating period are given as a little

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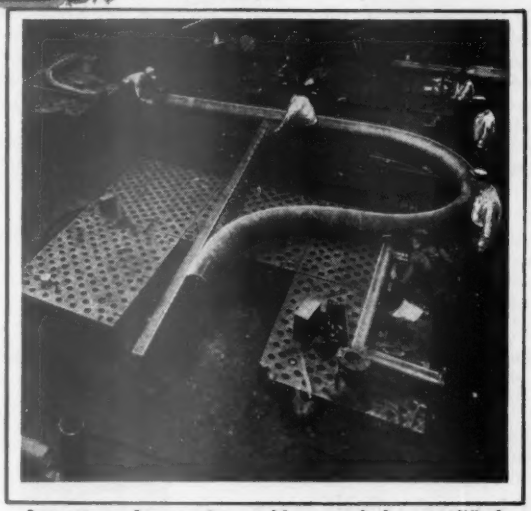

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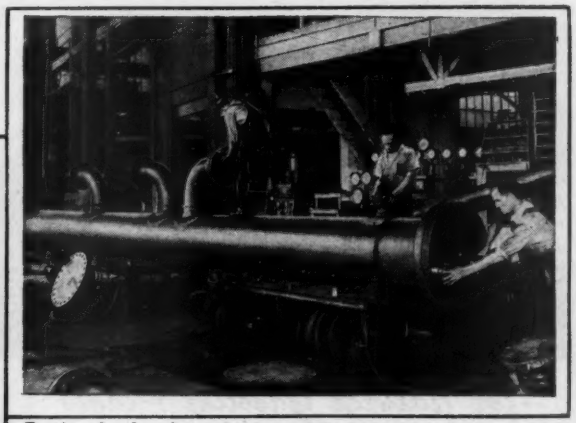

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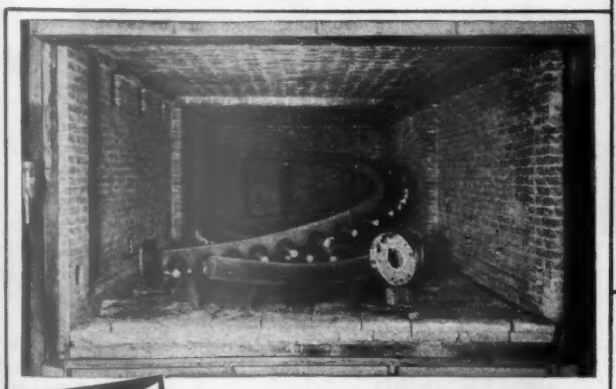

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over 6,600 bbl. per day. Running all the way from straight crude to various mixtures of crude and slop plus heavier materials the charging stock for the 22-day period averaged as follows:

	Per cent
Crude	66.75
Cracking stock	29.97
Recycle	2.29
Slop	0.99

Yields, from the unit, during the 22-day period, averaged out as:

	Per cent
PD	61.48
Polymer	0.60
Codimer	0.97
Recycle	2.41
Residuum	28.95
Loss	5.59

Crude, processed by the refinery, is obtained from Allen and Beebee wells and from the Madill, Fittstown, and Cromwell areas, with the bulk coming from Allen and Beebee wells. The crude is desalted and treated with added chemicals at the refinery. Salt averages 130 lb. per 1,000 bbl. of crude.

Changes in the stabilizer hookup includes the addition of a 28-plate fractionator and its accessory equipment and the installation of bypass connections in the interconnecting process lines. Ample flexibility for operating to aviation or motor-fuel blending components, is incorporated into the unit. Current operations are carried out with the unit operating at its highest efficiency for any desired product.

Other units recently installed at the refinery include a regenerative caustic gasoline treating plant and the facilities for increasing the capacities of the absorber and stabilizing equipment.

In the alteration of the two-coil thermal cracking unit no changes were made in the existing heaters which were provided with alloy tubes in the radiant sections and carbon steel in the convection sections. Under the plant's procedure for replacing defective tubes and headers, all tubes in all sections of a heater eventually will be alloy. The procedure for replacing defective carbon-steel tubes and headers with alloy has been in operation for some time and in consequence, a very small per cent of the tubes and headers in any of the heater coils are carbon steel. The new heater is provided with alloy tubes and headers throughout.

Engineering for the conversion of the cracking unit, which is one of two known plants employing a three-heater layout, was handled by Universal Oil Products Co. Procurement of materials and erection of the unit were carried out by Jones & Laughlin Steel Co.

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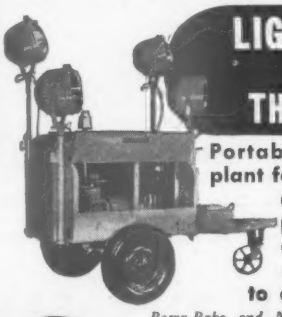

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Reserve Recoverable Before Production Starts Declining

*by Park J. Jones**

PART 14 OF A SERIES

THE reserve recoverable before the rate of production from reservoirs starts declining depends on the initial well-producing capacity, the rate of decline of well-producing capacity, and on the rate of production. Other things equal, the initial well-producing capacity depends primarily on the number of wells drilled. The decline of well-producing capacity depends on producing and operating methods. The reserve recoverable before production starts declining with a fixed number of wells and given producing and operating methods varies with the rate of production from reservoirs. The slower the rate of production, the higher the reserve recoverable before production starts declining. These points are illustrated graphically and by examples. In the case of oil reservoirs, the drilling of a comparatively large number of wells may cost more, as a rule, than injection of gas or water. The drilling of a comparatively large number of wells does not increase the barrels of ultimately recoverable oil. It increases well-producing capacity and the fraction, of a fixed initial oil reserve, which is recoverable before the rate of production starts declining. The foregoing considerations may influence optimum rates of production through investments, operating expenses, or size of reserve.

Well Producing Capacity Vs. Reserve

WE have seen, in Part 5 of this series, that the relationship between well-producing capacity V and reserve (1 — C) may be represented approximately by

$$V = (1 - C)^p \qquad (1)$$

where p is an exponent which depends on producing and operating methods. The curves in Fig. 14-1 are solutions of Equation 1. Well-producing capacity, in per cent of the initial well-producing capacity, is plotted against cumulative recovery. The latter is in per cent of initial reserve. Data are shown for values of p ranging from 0.5 up to 4.0.

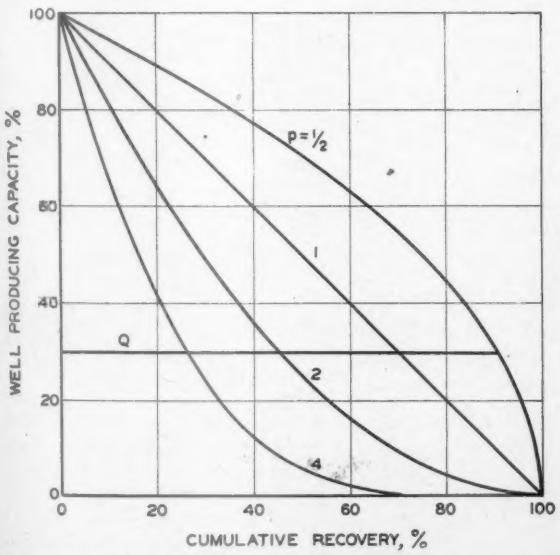
Let Q equal the rate of production at the time production starts declining. For example, let Q equal 30 per cent of initial well-producing capacity as illustrated by the horizontal line in Fig. 14-1. The intersection of this producing rate with well-producing capacity defines the reserve recoverable before production starts declining. Other things equal, the reserve recoverable before production starts declining depends on producing and operating methods. The following reserves are indicated in the example of Fig. 14-1:

Producing and operating methods, p	½	1	2	4
Reserve before production starts declining (%)	91	70	46	26

The Equivalent Life

The rate of production from reservoirs increases during periods of development. During the interval between the end of a development program and the time when the rate of production starts declining, rates of production may be either uniform or variable. Increasing and variable rates of production will be replaced by uniform rates of production for

*Production consultant, Houston.



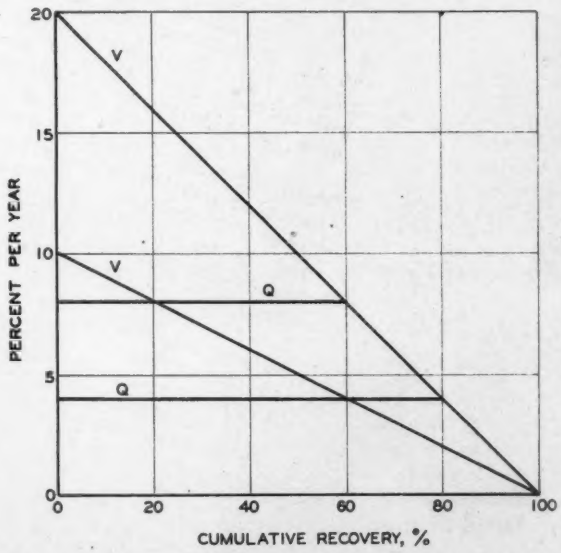


Fig. 14-1—(Left) Well-producing capacity vs. producing and operating methods; well-producing capacity in per cent of the initial well-producing capacity; cumulative recovery in per cent of initial reserve; producing and operating methods are characterized by p; Q is a uniform rate of production in per cent of the initial well-producing capacity. Fig. 14-2—(Right) Well-producing capacity V in per cent per year of an initial reserve vs. cumulative recovery in per cent of an initial reserve; intersection of rate of production Q with well-producing capacity V defines the reserve recoverable before production starts declining

XUM

SPANG T

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The National Supply Company

Dear Sir:

In regard to your inquiry of the tubing blowout in our well

We were pulling the 2-1/2" Spang Chalfant tubing and a packer in this well and had 1008 ft. left to pull when it suddenly started to blow the tubing from the well. After the excitement had died down, and we had looked the situation over, we found that the top joint of the tubing or the joint that had the elevator on it was still on the rig floor and the bottom joint or the joint that had the perforation on it was blown about 300 ft. from the well and lodged in a tree. The tubing between the well and the tree was twisted and curved in all kinds of shapes and there was not a break or a loose joint in the whole string.

When the tubing first started to blow out, it had to double up and blow out through the top of the rig in a hair-pin shape in order for the joint with the elevator on it to stay in the rig and the rest of the tubing blow out of the hole. It did not damage the rig very much, although it blew the crown block off which fell on the pulling machine, damaging it some.

As you can see in the picture, there is one complete loop of the tubing in the rig itself and there were 6 or 7 more coils twisted around on the ground to the left of the picture. We have subsequently cut this bent tubing in short enough lengths so that we can handle it and have straightened it and are using it for a gas line.

XUM

TUBING

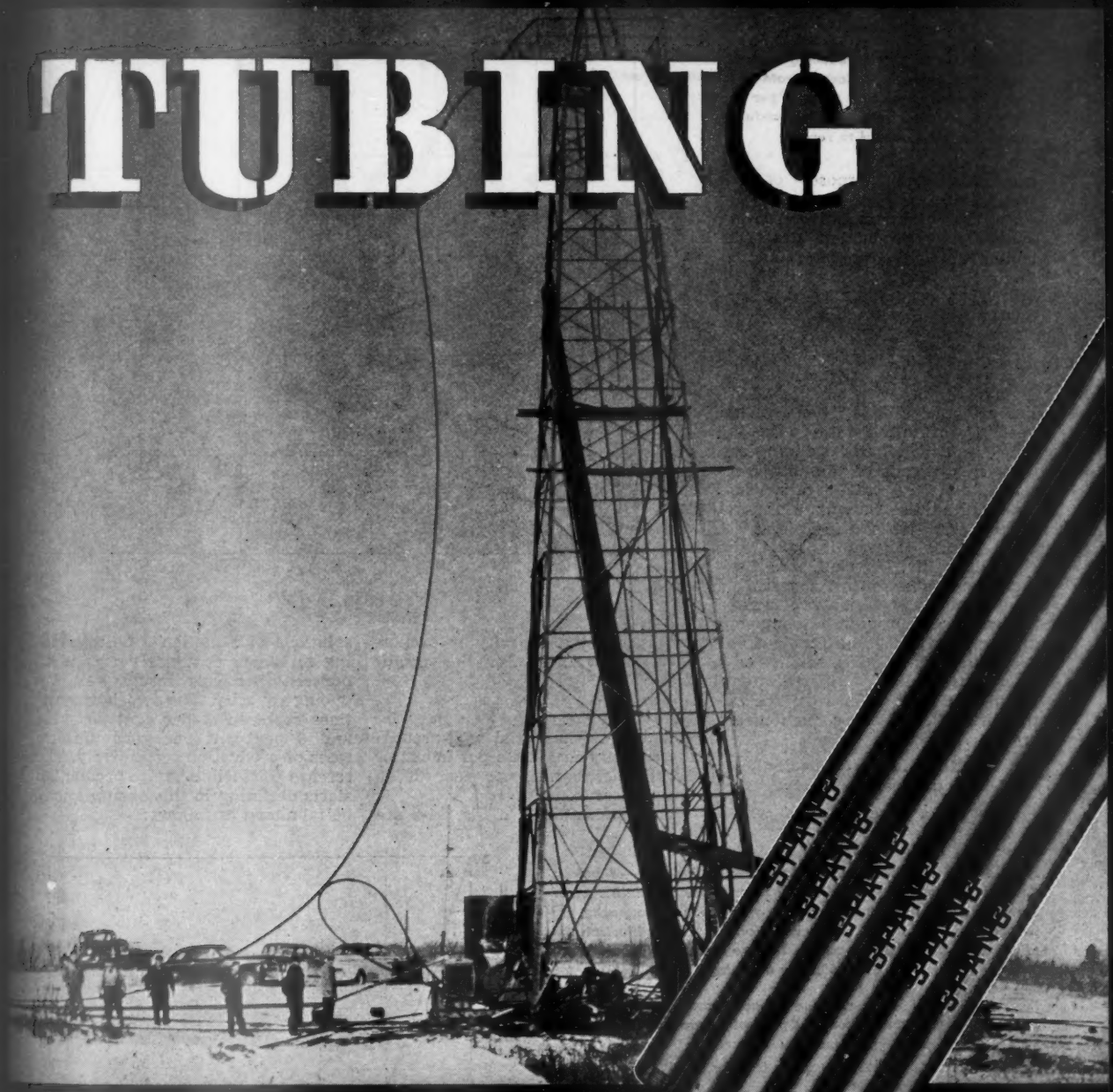

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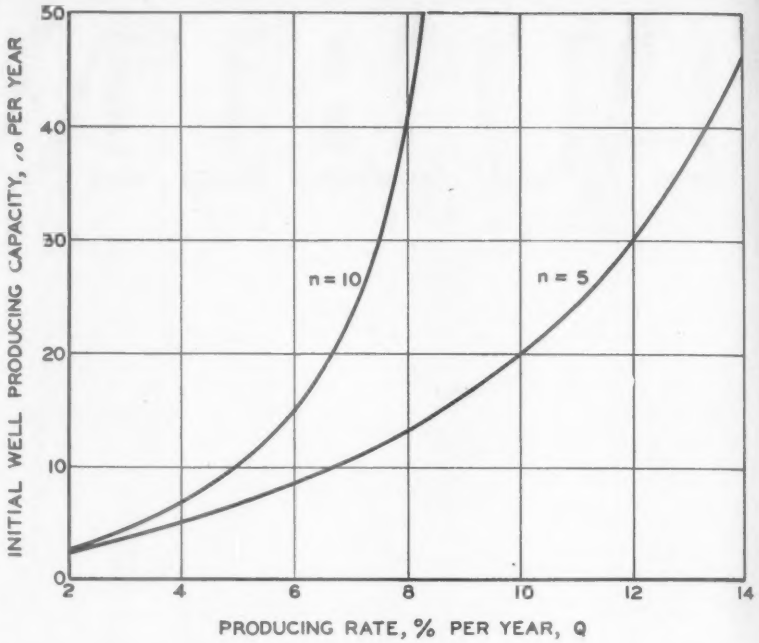
Fig. 14-3—Initial well-producing capacity required in order to produce at rate Q for 5 or 10 years; producing rates in per cent per year of initial reserve; well-producing capacity is proportional to reserve



the illustrative purposes of this series.

Let C be the cumulative recovery at the time production starts declining and Q, the rate of production. Then the number of years n required to accumulate C at a uniform rate Q is defined by

$$n = \frac{C}{Q} \qquad (2)$$

For example, if Q is 5 per cent per year of an initial reserve at the time production starts declining and C is 50 per cent of the initial reserve, then 50/5 or 10 years would be required to accumulate the recovery. The life of a reserve as defined by Equation 2 is called the equivalent life. In this procedure, increasing rates during a period of development and variable rates after a development program is completed are replaced by a uniform rate of production. The equivalent life of a reserve defined by a uniform rate of production may differ from the actual life reflected on production records.

Well-Producing Capacity Proportional to Reserve

Consider a reservoir for which well producing capacity is proportional to reserve. For this condition,

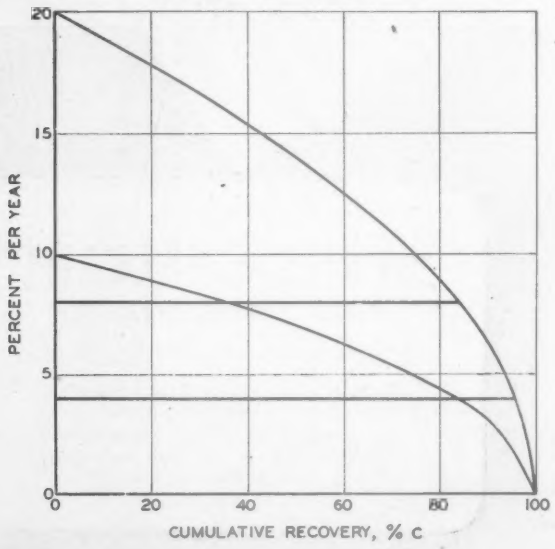
$$V = V_o(1 - C) \qquad (3)$$

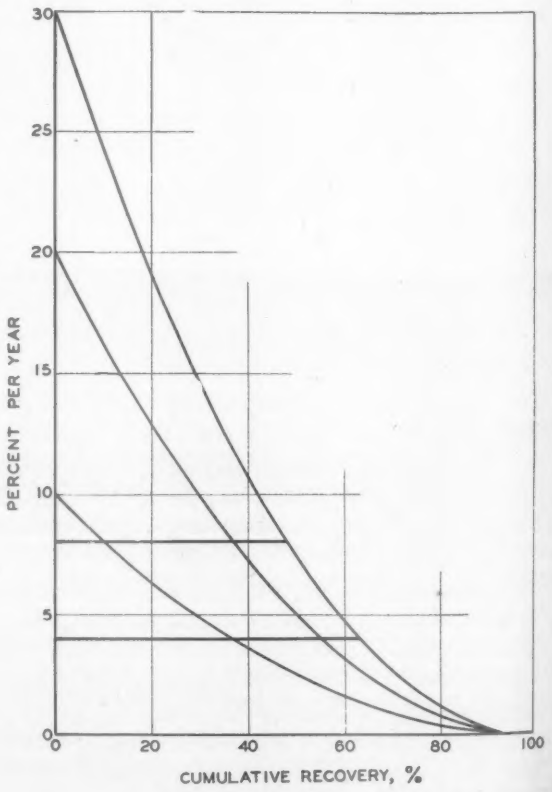
where V_o is the initial well-producing capacity in M.c.f.'s per M.c.f., or barrels per barrel, per year of an initial reserve.

The sloping lines in Fig. 14-2 are solutions of Equation 3 corresponding to 10 per cent per year and 20 per cent per year initial well-producing capacity. The two horizontal lines represent 4 per cent per year and 8 per cent per year uniform rates of production respectively. The reserve producible before production starts declining in this example may be tabulated as follows:

Fig. 14-4—(Below) Well-producing capacity and rate of production in per cent per year of initial reserve vs. cumulative recovery in per cent of initial reserve for well-producing capacity proportional to square root of reserve. Horizontal lines illustrate the effect of producing rates on the reserve recoverable before production starts declining

Fig. 14-5—(Right) Well-producing capacity and rate of production vs. cumulative recovery for well-producing capacity proportional to square of reserve





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ELECTRICAL EQUIPMENT FOR THE PETROLEUM INDUSTRY

Initial well producing capacity, % per year—	10		20	
Rate of production, % per year	4	8	4	8
Producible reserve, %	60	20	80	60

The initial well-producing capacity V_o required in order to produce at the rate Q for n years may be derived as follows: Let Q equal the rate of production in M.c.f.'s per M.c.f., or barrels per barrel, per year of an initial reserve. The rate of production Q is equal to well-producing capacity at the time production starts declining, that is,

$$Q = V_o(1 - C)$$

But in terms of a uniform rate of production,

$$n = \frac{C}{Q}$$

so

$$Q = V_o(1 - Qn)$$

from which

$$V_o = \frac{Q}{1 - Qn} \qquad (4)$$

Equation 4 defines the initial well-producing capacity V_o required in order to produce at a uniform annual rate Q for n years from reservoirs for which well-producing capacity is proportional to reserve. The curves in Fig. 14-3 are solutions of Equation 4. The required initial well-producing capacity is plotted against rates of production for a 5-year and a 10-year equivalent life. A 40 per cent initial well-producing capacity is required in order to produce at the rate of 8 per cent per year for 10 years. But only a 10 per cent initial well-producing capacity is required in order to produce at the rate of 5 per cent per year for 10 years. The following tabulations may be of interest:

Rate of producton, % per year	5	8
Equivalent life, years	10	10
Recovery at end of 10 years, %	50	80
Required initial well capacity, % per year	10	40
Ratio, initial well capacity to producing rate	2	5
Relative cost of development	1	4
Relative accumulated recovery at end of 10 years	1	1.6

Well-Producing Capacity Proportional to the Square Root of Reserve

Suppose well-producing capacity is proportional to the square root of a reserve. The well-producing capacity for this example is represented by

$$V = V_o(1 - C)^{0.5} \qquad (5)$$

The curves in Fig. 14-4 are solutions of Equation 5 for a 10 per cent per year and a 20 per cent per year initial well-producing capacity. The reserve producible before production starts declining in this example is as follows:

Initial well-producing capacity, % per year—	10		20	
Rate of production, % per year	4	8	4	8
Producible reserve, %	84	35	96	84

The rate of production at the time production starts declining is given by

$$Q = V_o(1 - C)^{0.5} = V_o(1 - Qn)^{0.5}$$

from which

$$V_o = \frac{Q}{(1 - Qn)^{0.5}} \qquad (6)$$

Equation 6 defines the initial well-producing capacity V_o required in order to produce at the rate Q for n years from reservoirs for which well-producing capacity is proportional to $(1 - C)^{0.5}$. The well-producing capacity V_o is required at the end of n years. It may be provided by drilling a sufficient number of wells during a development program. On the other hand, some of the wells may not be drilled until needed. Several factors are involved here including the basis on which allowables are allocated. Allocation of allowables on a per well basis may force the drilling of wells which otherwise may not be necessary at a given time.

Well-Producing Capacity Proportional to Square of Reserve

Under some conditions a decline in reservoir pressure causes a comparatively rapid decline in well-producing capacity. A decline in reservoir pressure may reduce the effective permeability to oil significantly. A decrease in effective permeability is accompanied by a decline in well-producing capacity. Suppose the decline in well-producing capacity is proportional to the square of a reserve. The well-producing capacity in this example is represented by

$$V = V_o(1 - C)^2 \qquad (7)$$

where the symbols have the same meaning as above. The curves in Fig. 14-5 are solutions of Equation 7 for 10, 20, and 30 per cent per year initial well-producing capacity. The reserve producible before production starts declining in this example is as follows:

Initial well-producing capacity, % per year—	10		20	
Rate of production, % per year	4	8	4	8
Producible reserve, %	37	10	55	37

The rate of production at the time production starts declining is given by

$$Q = V_o(1 - C)^2 = V_o(1 - Qn)^2$$

from which

$$V_o = \frac{Q}{(1 - Qn)^2} \qquad (8)$$

Equation 8 defines the initial well-producing capacity required in order to produce at the rate Q for n years from reservoirs for which well-producing capacity is proportional to the square of reserve.

A 30 per cent curve is included in Fig. 14-5. This curve illustrates that the drilling of additional wells does not increase the barrels of ultimately recoverable oil. Additional wells increase well-producing capacity and the reserve recoverable before the rate of production starts declining. The data in Fig. 14-5 are for oil reservoirs having a primary gas cap. If a reservoir has no primary gas cap and oil is produced by evolved solution gas, well producing capacity declines at some such rate as is illustrated by the bottom curve in Fig. 14-1. But well-producing capacity for some undersaturated oil reservoirs may decline even faster than the rate illustrated by the bottom curve in Fig. 14-1. In these examples, the drilling of a comparatively large number of wells may be a more costly method of providing well producing capacity than by injecting gas or water.

The factors reviewed in this article may influence optimum rates of production through (1) the investments required for reservoirs, (2) operating expenses, or (3) the size of an initial reserve.

BOOKS

SURVEY OF I. G. FARBENINDUSTRIE MADE AVAILABLE. A full economic survey of the activities of the huge German dye and chemical cartel, I. G. Farbenindustrie A. G., has been completed and is available from the Publications Board, U. S. Department of Commerce. It covers the organization of the company, its production and sales, sales methods, expenditures on research and new plants, prices of products, acquisitions made from conquered countries, etc.

The survey is available in microfilm, price $6.00. Four more rolls at the same price per roll are available showing supplementary data in the German language. Checks are to be made payable to the Treasurer of the United States and sent to the Board at Washington 25, D. C.

OIL AND PETROLEUM YEARBOOK, 1945. Compiled and published by Walter E. Skinner, 20 Copthall Avenue, London, E. C. 2, England 12 s. 6 d.

The 1945 edition, the 36th year of issue of this standard reference work, presents complete and up-to-date particulars concerning 541 companies covering all branches of the oil industry. American and foreign companies are fully dealt with.

The particulars of each company comprise names of directors and other officials, seat of operations, description of business details of capital, dividends, and financial results. Other useful features are names and addresses of 257 managers and engineers and the names of the companies in the book with which they are connected, and a Buyers' Guide of Manufacturers of oil-field and refinery equipment, comprising 370 headings.

XUM

Numerous Improvements in HF Alkylation Will Cut Costs and Reduce Losses

*by W. B. Shanley and H. J. Nebeck**

Important improvements have been made in the HF alkylation process which enable the operator to keep the units on stream longer, handle a wider range of charge stocks, and require less maintenance, also using less chemicals than earlier units consume. HF loss through acid tars has been practically eliminated, reducing catalyst costs. Future plans show that propylene will be an important feed stock, enabling the refiner to make more alkylate from available olefins and to show lower losses to uncondensed gases.

THE unique situation, wherein 28 new HF alkylation units of relatively the same age have operated during the war period, all of which had to operate so that there might be an ample supply of aviation gasoline and which were run by as many groups of management, engineers, and operators, yielded a faster and more efficient development of the process than would normally have taken place.

That the units have performed well is a matter of record, but, as might be expected, the new process had certain shortcomings. At times the plants were not easy to maintain, because of indifferent valving. They used more HF per barrel of alkylate than the designer contemplated. Output of alkylate was limited at times because of imperfections in the acid-regeneration system, and because of corrosion difficulties originating in the the use of the defluorinating agent—bauxite.

Solutions to all of these problems are matters of accomplished fact. Developments have been such that the new HF units will:

1. Stay on stream longer.
2. Be easier to operate.
3. Require less maintenance.
4. Use less chemicals and utilities.
5. Handle a wider range of charging stocks.

Of the utmost importance is the fact that the developments which have been brought about may be adapted without difficulty to the existing plants with all of the effectiveness that their incorporation into new units will produce.

*Universal Oil Products Co., Chicago.

On stream times of 92 per cent plus are in order. Materials of construction are at hand and in use which reduce HF maintenance to an order consistent with that of so much equipment operating in hydrocarbon service. Acid consumption, exclusive of mechanical losses of ¼ lb. per barrel will be obtainable and mechanical losses will be markedly reduced. Through the elimination of acid leakage, expenditure of chemicals for neutralization will be correspondingly lessened and disposal problems will be similarly minimized. Again, improvements in materials of construction, "the right trim in the right place," will greatly simplify operation. Proper control of vent gas streams will permit the processing of propylene in quantities limited only by propane rejection equipment.

High Stream Efficiency

The new or modified HF units will stay on stream longer and will be freed from breakdown of equipment largely as a result of two important changes, notably through the development of an improved regeneration system and through the relocation of the defluorination towers.

The best in acid regeneration requires the use of a single tower which rejects both acid tar and water as a bottoms product. Such a unit has been running for a year and a half. Acid preheaters of new design reduce tube failure to a minimum and are built so that there is no direct connection between the hot and cold mediums, thereby providing against contamination of acid with water and the reverse. The new acid regeneration column will be refluxed and so will effect regeneration of system acid through fractionation.

Fractionation produces a top product of high HF quality and a bottoms product low in acid. Thus an acid tar is rejected from the column sufficiently free of acid to burn directly under boilers or in cracking plant or reboiling furnaces except when it is necessary to dehydrate

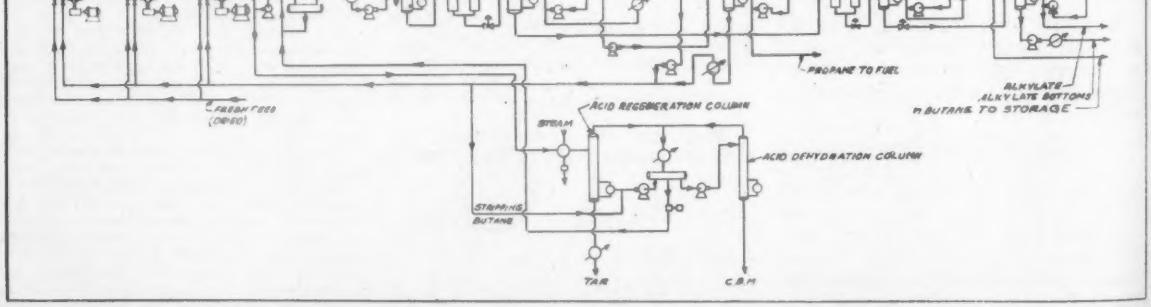


Fig. 1—Flow chart of typical alkylation unit processing butylene

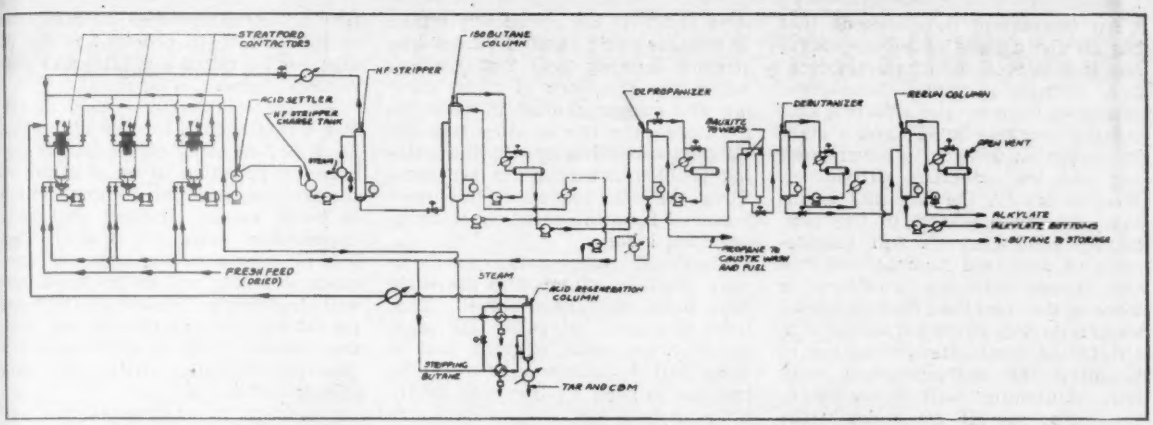


Fig. 2—Flow chart of typical alkylation unit after streamlining

the acid. When operating without reflux a considerable amount of light oils passes overhead with the regenerated acid, and is in effect recycled from the regeneration unit to the alkylation plant proper and back again, thereby loading up the system. In the refluxed single-tower operation, these light oils are removed with the tar and a high-quality HF overhead is produced. Maintenance of good system acidity is thus facilitated, and operating costs are lowered. The new unit returns acid and stripping isobutane directly to the contactor so that the isobutane used in stripping also serves to increase isobutane olefin ratio. Finally, the internal equipment in the acid regeneration column is designed to minimize acid hold up, thus making possible the use of steel in this service on a reasonable replacement basis. Commercial-size experimental towers indicate the possibility that monel cladding of the column will be economically justified and will further reduce maintenance and operating costs.

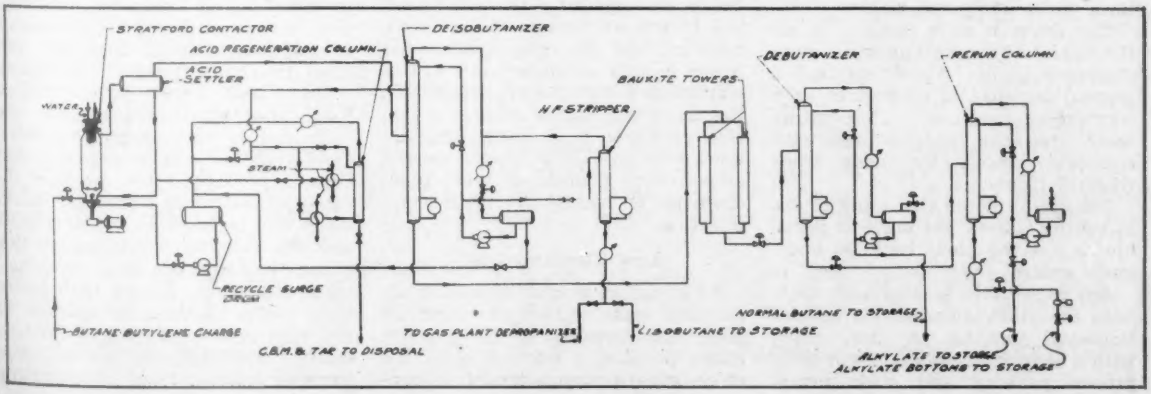
Development of acid regeneration is such that no longer will this section of the unit force plant shutdown or limit output of alkylate. Adequate capacity in this section of the plant will reduce the loss of acid through combined fluorine production.

The item of combined fluorine and its attendant acid loss, silicon tetrafluoride corrosion, abrasion difficulties, and the maintenance and shutdowns resulting therefrom will be eliminated in the new units and are being eliminated in existing plants by the simple expedient of relocating the bauxite towers.

The bauxite towers in the U.O.P. units were located after the HF stripper in order to provide a positive separation of acid and hydrocarbon section. This was done because when the units were designed it was contemplated that difficulties would be encountered in handling anhydrous HF. Therefore, positively containing the acid in one section of the unit appeared most advisable. It has developed that the handling of acid-hydrocarbon mixtures is no problem. The bauxite towers retain a small amount of HF charged to them, but release a compound, silicon tetrafluoride, which, although most troublesome, can be controlled. Because the problem of containing HF is rather a simple matter and because appreciable acid saving can be effected by returning the isobutane recycle to the contactors without defluorination, it follows that the bauxite towers have no place ahead of the deisobutanizer; their relocation therefore, is a logical step. Additional chemical savings which result from this move are discussed later. Because some defluorination of alkylate and of normal butane is desirable, smaller defluorinating towers do have utility down stream from the deisobutanizer. These towers, however, can better be loaded with alumina or bauxite of low silica content which yield no silicon tetrafluoride.

Relocation of the primary defluorinating towers is no problem in new units. In existing plants their relocation involves conditioning the deisobutanizer for acid service, which requires in the main the substitution of steel for the cast iron generally used in the deisobutanizer column pumps. Tests have shown that cast iron bubble decks are suitable for the deisobutanizer even though the column handles some acid. Thus the investment required to permit operation without primary bauxite is small and the payout will be considerably less than a year through chemical and maintenance savings. The Socony-Vacuum people were the first to use this type of plant hookup.

Fig. 3—Flow chart of recently designed butylene-HF alkylation unit



XUM

An interesting development that has all the aspects of a very useful one is that of aluminum defluorination. Metallic aluminum decomposes combined fluorine and effects a substantial recovery in HF and a similar reduction in bauxite tower loading and the attendant difficulties. Were it not for the fact that isobutane can be returned to the contactors containing its full complement of combined fluorine and that this stream contains two-thirds or more of the combined fluorine make, aluminum defluorination would constitute the most effective means of handling the defluorination problem. Aluminum will be useful in recovering the HF contained in the deisobutanizer bottoms stream.

In summary, improvements in acid regeneration systems and relocation of the defluorinating towers will serve to eliminate the factors which have been the major cause for unscheduled shutdowns and for shutdowns forced by the need for inspection. With these developments the HF process will readily operate on a basis of 92 per cent plus on stream time.

Simple to Operate and Maintain

The HF units had their share of trouble in the early stages of their operation. Troubles were experienced with pump packings, with pumps which froze, control valves which stuck, and block valves which refused to move, or if they did move, failed in the plug. From these difficulties there soon developed, however, a knowledge of what material worked and what did not. Now with the "right trim in the right place" the HF operator's work has become much easier.

Packing of pumps which handle system acid or acid in hydrocarbon is no more difficult than packing pumps that handle light hydrocarbons. A selection of the proper packing and the maintenance of a small flush stream have made it possible to use the conventional box in either service. However, the mechanical seal which in the early days was used entirely as a packing for anhydrous HF, will continue to be of real service.

The fluoride scale familiar to all HF operators stopped many a close clearance pump. There resulted a general increase in clearances as a combative measure. Close-fitting wear rings can now be used with complete success by using wear rings of monel.

The use of monel stems and guides in control valves has made it possible to put the plant back on automatic control.

An important development, perhaps the most important, is that of improved valving. A steel valve with a long stuffing box fitted with proper packing and with monel stem and trim has completely tamed anhydrous acid and hydrocarbon streams bearing acid and has reduced the problems of plant valving and stream shutoff to orthodox solutions. The use of alloy trim for all-steel cocks has solved the valving problem where cocks are used. Thus the HF operation has been removed from the category of back-breaking labor.

Similarly, maintenance problems very much in evidence in the early days have since been solved. That there are good valves for HF service may not mean a great deal to many, but the maintenance man who has had to pack a pump with faulty plugs in both suction and discharge is well qualified both to appraise and to appreciate this development. Of major importance is the fact that with good valves there is no need to adhere to the rigid greasing schedule that was needed when carbon steel plugs required a constant application of grease to prolong their life until the next shutdown.

Maintenance will be simplified through the installation of the simple, single-tower acid-regeneration system. Also, relocation of the bauxite towers and elimination of the release of silicon tetrafluoride to fractionating equipment will reduce markedly the number of man hours consumed in condenser cleanout, valve repair, and similar tasks.

Of particular importance for the utility of the HF process is the overall simplification of plant, in design and in fact, that has taken place as operations have proceeded. HF was supposed to be a bad actor and the units that first went on the line had a great many extras that were meant to protect equipment and the operators against the acid. Experience has shown that HF is not as originally advertised—its properties suggest a respectful attitude but no longer inspire fear. Good practice in handling strong chemicals suffices for HF as for strong caustic or sulfuric acid.

A resolution of the accentuated ignorance factor has permitted many simplifications.

The exhauster system has been cut down and may be eliminated; the blowdown system is less complicated; the flushing system has fewer points of injection; instrumentation design may be handled in the usual way rather than as a special problem; acid levels, an unknown in the early plants, permit of accurate measuring; and plant drainage is handled without complication.

Low Chemical Cost

As is the case with operating efficiency and equipment performance, developments in HF practice make possible a marked reduction in chemical consumption. It is contemplated that process consumption of HF will be in order of ¼ lb. of acid per barrel of alkylate, and mechanical losses can be small.

An appreciable percentage of HF above that needed for alkylation has been lost on some of the plants because of rejection of an acid tar at the acid regeneration column, which in being poorly stripped contained appreciable quantities of acid. This will no longer be the case, for adequate stripping will be provided, nor will stripping be limited by the need for taking light soluble oils out with the bottoms. Refluxing the acid regeneration column will take care of this loss of HF.

Combined fluorine production and neutralization of bauxite has, on the average, accounted for a consumption of .3 lb. of acid per barrel of alkylate. Relocation of the primary defluorinating towers will reduce this consumption to .1 lb. per barrel or less. A similar reduction may be effected by aluminum defluorinators. As acid consumption is reduced by this means so too will be the consumption of bauxite or its equivalent.

Another sizable percentage of acid consumed has been rejected from the acid regeneration system in order to maintain a water balance. The feed-drying systems employed—both the desiccant and distillation type—have been entirely satisfactory. However, in the units with bauxite towers ahead of the deisobutanizer, water has been brought into the system in the fresh bauxite and is released in service. Formation of silicon tetrafluoride is accompanied by the formation of water which is likewise released. Water so released has been returned to the contactors with the recycle and has been expelled from the unit with an equivalent quantity of HF. This mechanism has accounted for consumption in the order of ⅓ lb. of acid per barrel of alkylate. Relocation of the primary defluorinator towers will eliminate this usage. Since acid released from the acid regeneration unit has been neutralized generally with lime or calcium chloride, a corresponding reduction in neutralizing chemical consumption will result from improvements in acid regeneration operation and from the bauxite tower relocation.

High acid losses have resulted from undetected leakage into the exhauster or vacuum purge system. Operating experience suggests that equipment should not be tied directly to the purge setup. No direct tie-in will be made in the new units and the existing plants where this change has not been made may well be so modified. Again, high losses have occurred through spillage to the vent scrubbing system, through safety and dropout valves, and through misalignment of operating

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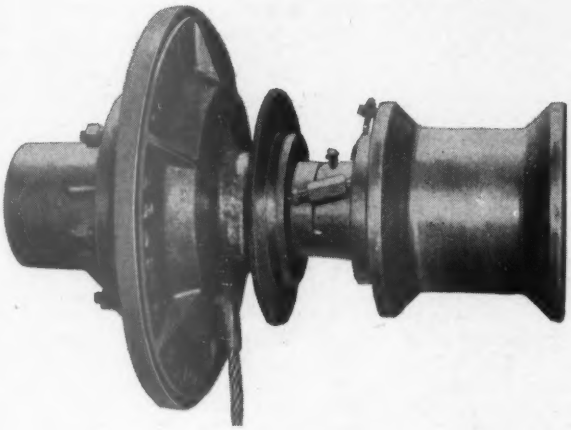

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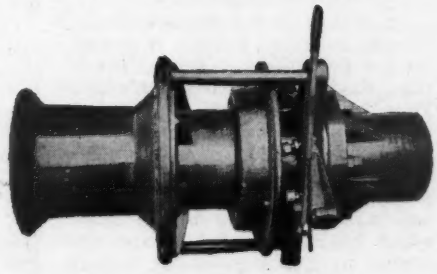

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MASTERS	600	810	18.22	272.154	362.872	28½ x 30 x 38	723.901 x 762.002 x 965.202

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hookups. Against such losses, the new units will be provided with a subcooled knockout drum system in place of the initial caustic (KOH) scrubber. Thus acid so released will be, in the main, recovered. Similarly KOH will not be consumed as at present as a result of these spillages; therefore, a further reduction in chemical consumption will be effected.

Considerable saving in acid will result through the operation of an efficient scrubber for processing the noncondensibles which are vented from the acid section of the plant.

Finally, chemical requirements will be lessened, and the saving here can be appreciable, owing to the fewer shutdowns that will result from a better on stream efficiency.

Propylene to Be an Important Feed Stock

Developments have shown that the HF process produces a good grade of alkylate from propylene. The processing of propylene, either by itself or with other olefins, can be handled without special treatment process-wise. Because this olefin is the least expensive, new units will in all probability provide ample means for propane rejection which currently limits propylene processing in those existing units not designed to handle this feed. Similarly it has been found advantageous to modify existing units that are short on propane rejection equipment in order to permit the processing of more propylene. This can be handled quite cheaply.

Amylene can be processed advantageously in HF units. Its processing, either alone or with other olefins, requires only a stepup in acid regeneration rate, with no increase in chemical consumption.

Operations have so developed that a lesser isobutane recycle is needed for the production of good alkylate than the designers first provided. Thus the new units will be designed for external ratios in the order of 3.5:1. The existing units with HF strippers, in addition to the margin provided by an ample external ratio, have a further margin in this regard which has been used by many operators to increase alkylate output while holding quality constant. Overhead from the HF stripper is largely isobutane. This was originally returned to the stripper feed. By returning the stream to the contactors an increase in external ratio is obtained without any expenditure.

A brief look at a new unit in the process of design may be of interest. This unit will run without circulating acid and without stripper feed pumps, will combine stripper and deisobutanizer, and will run with defluorination after the deisobutanizer column.

The three flow diagrams, Figs. 1, 2 and 3, diagrammatically illustrate the simplifications that have taken place in the HF alkylation processes. Fig. 1 is a flow diagram of an original design. Fig. 2 is the same design after streamlining, that is, principally the simplification of the acid regeneration section and omission of the primary bauxite treaters. Fig. 3 is a flow diagram of a recently completed design.

In summary the developments that have taken place over the first 2 years in which HF alkylation has operated commercially have yielded much that contributes to the refinement of the operation and to the ability of a given unit to produce more alkylate per stream day at a lower cost. The nature of these developments has been such that they can be as readily incorporated into existing plants as into new units.

Lake Creek Cycling Project

(Continued from page 66)

Fig. 1. Superior B-1 is the deepest well in the field, having been drilled to a total depth of 13,300 ft. (from surface). This well was plugged back and completed in the A, B, and C zones.

Superior cycling operations in the Lake Creek field were begun in August 1943. The network of lines comprising the gathering and injection systems range in diameter from 2-in. laterals to 7-in. main lines. The gathering system is designed to take gas from wells at 1,000 and 1,500 lb. and plans are now being made to install a 300-lb. gathering system. The gathering system in this field is now handling approximately 42,000,000 cu. ft. daily.

One thing in particular which has contributed to the efficiency of this system is the fact that it is completely insulated with laminated asbestos. Freezing occurs at around 56° in the 1,500-lb. gathering line. The temperature of the gas as it comes from the wells varies between 80° to 150° F. On the well side in this system well pressures run up to approximately 3,700 lb.

The injection system consists of 6 and 8-in. main lines with 3 and 4-in. laterals on the 4,100-lb. portion. In the case of the 5,000-lb. system, the main line is 4-in. with several 3 and 4-in. lateral lines. A manifold system at the wells permits the injection of gas at either of the two mentionel pressures. Approximately 31,000,000 cu. ft. are being injected into input wells.

An electrolytic model table is being used as a basis in establishing production and injection rates in the Lake Creek field. According to M. U. Broussard, chief engineer of The Superior Oil Co., the company hopes that by continuous checking of the injection pattern on the table and adjusting the future production and injection rates in the field, a very efficient cycling recovery can be obtained. While it is too early in the life of the field for a positive statement, there are indications that the electrolytic table predictions are in very close agreement with the field data.

R. A. Daugherty, superintendent of gas department, Mid-Continent division, and Paul Stagg, assistant superintendent

BOOKS

AMERICAN PETROLEUM REFINING—Third Ed. By H. S. Bell. D. Van Nostrand Co., New York. 619 pp.

This revision of a well-known work on refining processes shows the addition of a considerable amount of new material covering the processes developed since issuance of the second edition in 1940. A large proportion of refining technology has developed since that date. While bringing a part of the work up-to-date the author has retained much of the material in earlier editions. The book therefore appears to be as much a history of refining processing as a reference work on current methods and their products.

The book is brief and therefore not too much data can be given on any one subject. Good data are presented on heat transfer. Heat-balance and material-balance are good though simple and brief. Discussion of modern heaters seems to be adequate though brief; too much space is devoted to a discussion of shell stills, which appears to be academic and historical rather than current practice. Fairly extended discussion is given to filtration and press-methods of dewaxing, but less attention is paid to the more modern processes although all are covered in brief.

The author gives some pertinent attention to methods of packaging and manufacture of especially wooden barrels, and to can making. Methods and equipment employed in these procedures are given. Good, brief coverage is given also to storage units and evaporation loss reduction. Good explanations are given of hydrocarbon structures, although proofreading erred in some instances. Altogether the book appears to be a fairly good volume for the reader who is just beginning the study of refining processes or who wishes to study the more important over-all principles, historical as well as current practices on refining.

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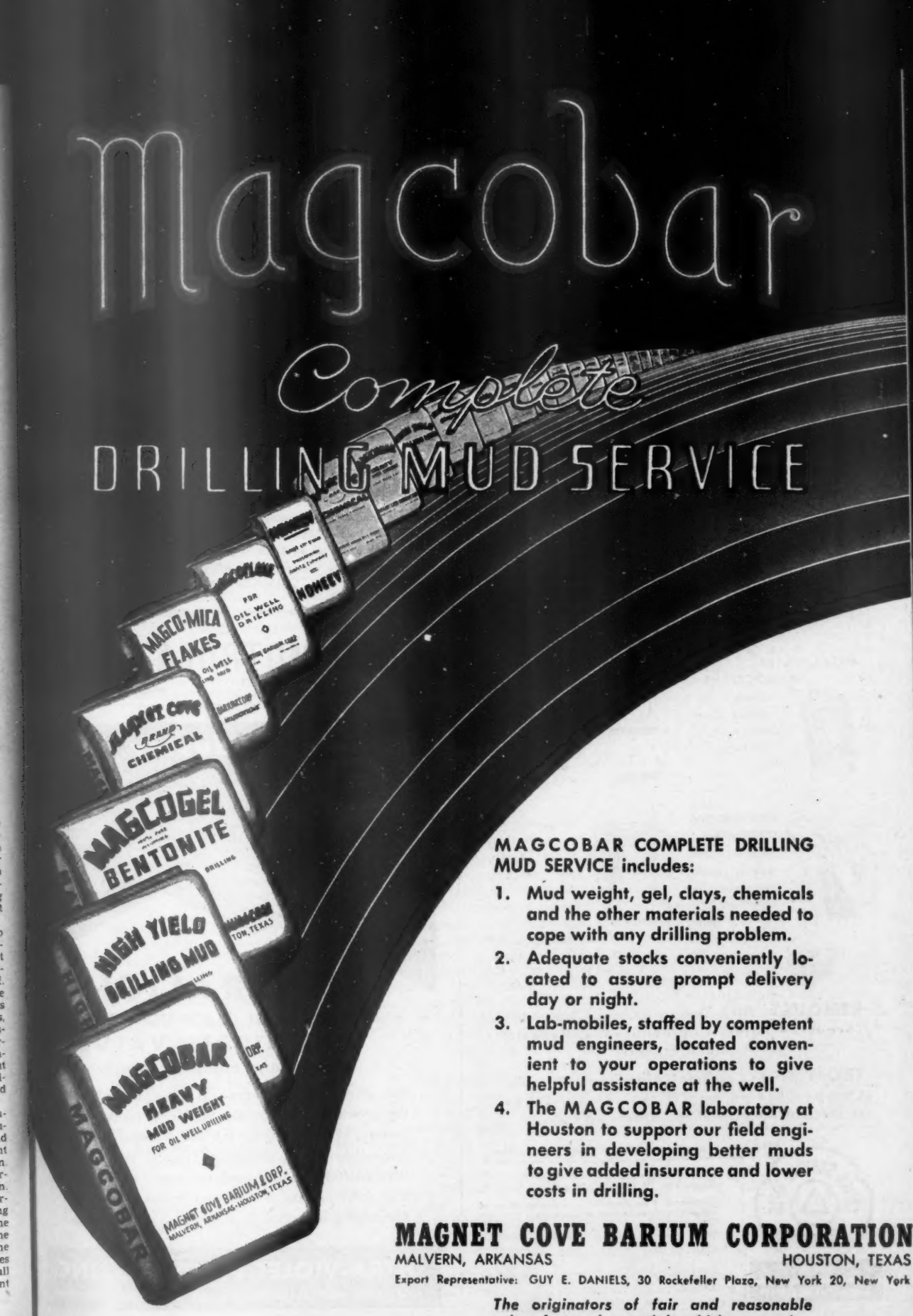

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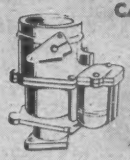

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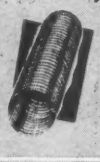

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Tower Inspection

THE keeping of a comprehensive and detailed record of each equipment and its condition at periodic inspections is of primary importance. Such a record should consist of data on: (1) Original equipment, (2) history of operating conditions and changes in the equipment, (3) detailed inspection sheets or forms upon which the condition of each item of equipment can be recorded and checked, and (4) field notes of the inspector.

1. Original equipment.—Data on manufacturer, date of installation, codes under which it was fabricated, type of construction, hydrostatic tests including ones made after installation, detailed drawings, contemplated operating conditions, etc.

2. History.—Record of inspection dates, changes or additions, repairs, operating conditions, settings of relief valves all clearly marked so that further detailed information can be readily found under Item 3 which follows:

3. Inspection sheets. — A rolled-out plan of the shell or a clear vertical elevation sketch with all connections marked and numbered, and a detailed tabulation of each part of the equipment such as connections, valves, plates, heads, manholes, and all areas of the shell should be provided. Detailed sketches of inspection layouts of intricate parts such as plates should be included. Finally, space should be provided for approval to enter the vessel after steamout.

Good Housekeeping

Although general cleanliness cannot be easily described in terms of numbers, it is nevertheless, of fundamental importance. If surfaces, corners, recessed portions, etc., are not thoroughly cleaned, their condition cannot be judged. Unless cleaning is done regularly, accumulations of debris, rust, scale, etc., will become loosened in increasing amounts until continual trouble is encountered with plugged lines or coolers, inability to draw water from drain lines during operation, weep (or tray drain) holes become plugged so that steamout at time of shut down is prolonged, failure of relief valves to function, and even accumulations at the foot of the downcomers so that capacity is reduced or erratic tower operation results. A definite record should be kept on the cleanliness of such items as (1) relief valves, (2) withdrawal valves, (3) drain valves, (4) weep holes on each tray, and (5) dirt under downcomers.

Aside from the direct need of cleanliness, the general improvement in the morale of plant operators and workmen who have developed habits of cleanliness and care, will result in better operation throughout the entire plant.

Thickness

The main job of tower inspection is the determination of thicknesses. Minimum thicknesses at which the tower or part should be replaced or repaired were indicated for the shells of vessels in The Refiner's Notebook No. 66 (November 3, 1945, p. 127). Retiring thicknesses are shown in parenthesis in the tabulations. Retiring thicknesses for nozzles are stated in the A.P.I.-A.S.M.E. code. The following are some of the methods of determining the thicknesses of tower shells. Surfaces for measurements should be cleaned by sand blasting, scaling, brushing, scraping, etc., depending upon the condition and location of the surface.

1. Hammer sounding by an experienced inspector will assist in directing attention to thin areas, and is particularly useful when unflanging is impossible. Looseness of linings can be readily detected.

2. The Penetron is a newly developed instrument which, by the use of radioactive materials, can be used to determine the thickness of metal plate or sections, by working from only one side of the material. It will undoubtedly become a chief way of determining thickness.

3. Drilling is widely used but care must be taken that the holes are tightly plugged and that stresses are not caused if the holes are plugged by welding. A common procedure is to drill holes for the first test and then insert corrosion resistant plugs which are thereafter used as indicated under Item 5 below as measuring points.

4. Depth holes drilled to a depth equal to the corrosion allowance are useful. The decrease in depth between readings is the amount of corrosion. The bottom of the hole must be protected from corrosion by means of a screwed plug or some soft filling but the full depth of the hole must be exposed at each test.

5. Noncorrosive strips or buttons (or the stainless steel threaded plugs of Item 3) may be welded inside the shell at areas which will most probably corrode. The distance that these reference marks protrude from the wall after corrosion takes place may be used as a measure of the extent of corrosion, or inside diameter measurements may be taken between such points providing bulging or radial distortion of the vessel does not occur. A good method of checking on bulging (it occurs primarily in vessels which contain no trays or crossbracing) is to stretch a wire along the true center line of the vessel and measure the radius in each direction.

Inspection Tools

In addition to regular refinery equipment such as tape lines, rules, spirit levels, plumb bobs, etc., the following tools are recommended:

1. Outside spring calipers, 6-in.
2. Inside spring calipers, 12-in.
3. Outside lock-joint transfer calipers, 12-in.
4. Inspector's own ball peen machinists hammer.
5. Rule (6-in.) graduated to 64ths.
6. Magnifying glass.
7. Flashlight.
8. Pocket mirror.
9. Scraping tool for cleaning test holes, etc.
10. Inspector's gages, ½-in. and ¼-in. capacity.

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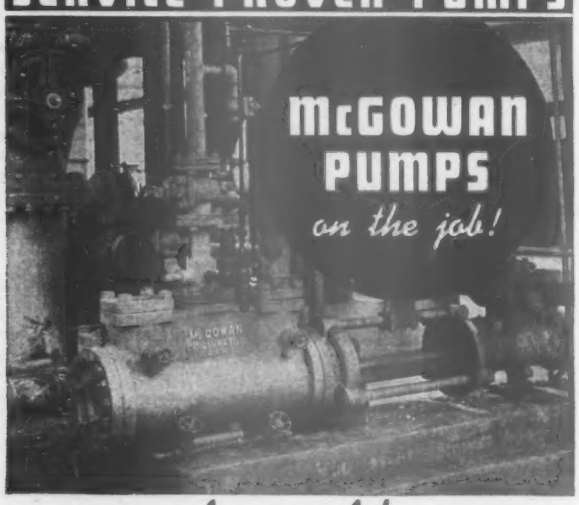

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A FEATURE OF THE OIL AND GAS JOURNAL

Construction of Concrete Foundations

THE two most common concrete installations in oil fields are foundations for derricks and foundations for pumping equipment. Essential engineering features involved in their construction are reviewed briefly:

Derrick foundations. — Essential function of a derrick foundation is to support the maximum dead load on the derrick, the live load of the pipe and drilling tools, and the vertical component of the force of wind. Foundations should be heavy enough to serve as an anchor to prevent overturn of the derrick by strong winds with or without the aid of guy wires. A typical load on a derrick corner is as follows:

Crown block load and weight of derrick	109,125 lb.
Weight of derrick substructure	1,200 lb.
Weight of derrick floor	1,000 lb.
Total load on derrick corner	111,325 lb.

Pressure of wind on a derrick is calculated as follows:

$$P = 0.0024\ V^2$$

where V is the velocity of the wind in miles per hour, P is pressure exerted in pounds per square foot of exposed area. If the corner foundations are sufficiently heavy and the derrick is tied to the foundations, the derrick will stand any ordinary wind pressure without guying. A 122-ft. derrick, for example, has about 425 sq. ft. of exposed area. A wind having a velocity of 70 m.p.h. will set up a pressure of about 12 lb. per sq. ft. of area. Thirty-six 90-ft. stands of pipe have an exposed surface of about 360 sq. ft. Thus (360 + 425) × 12 = 9,420 lb. An extreme hurricane wind of 120 m.p.h. will exert a pressure of about 45,000 lb.

Derrick foundations are most commonly designed with the base in the form of a cube and the top in the form of a truncated pyramid. The area of the base of the pyramid depends upon the strength of the soil. The weaker the soil, the larger is the base of the foundation to prevent settling of the foundation. Average strengths of typical types of soil are given in the following table:[1]

BEARING POWER OF SOIL

	Lb./sq.ft
Hard rock (equivalent to best brick masonry)	35,000
Soft rock (equivalent to poor brick masonry)	15,000
Clay, hard	6,000
Clay, soft	3,000
Gravel and coarse sand	18,000
Sand, consolidated	10,000
Sand, unconsolidated	6,000
Quicksand, loose and alluvial soils	1,500

COMPRESSIVE AND SHEARING STRENGTH OF CONCRETE

	Lb./sq.ft.
Safe compressive strength of concrete	57,600
Safe shearing strength of concrete	7,200

From these data one can calculate, according to formulae presented by Zaba and Doherty,[1] the required bearing surface, B, on soils and size of bearing plate b as follows:

$$B = \frac{\text{Total load on derrick corner}}{\text{Bearing power of soil}}$$

$$= \frac{111{,}325}{3{,}000} = 37.11 \text{ sq. ft.}$$

The base squared

$$= \sqrt{B} = \sqrt{37.11}$$

or approximately 6 ft. by 6 ft.

The required size of the bearing plate, b, for these specifications is then:

$$b = \frac{\text{Total load on derrick corner}}{\text{Compressive strength of concrete}}$$

$$= \frac{111{,}325}{57{,}600} = 1.193 \text{ sq. ft.}$$

or 1,719 sq. in.

Therefore, $\sqrt{b} = \sqrt{1{,}719}$ or 13.1 in. per side (13.1 × 13.1).

The required height, H, for the foundation is:

$$H = \frac{(B - b) \times P}{4B\sqrt{b} \times \text{shearing strength of concrete}}$$

$$= \frac{(37.11 - 1.193) \times 111{,}325}{4 \times 37.11 \times \sqrt{1.193} \times 7{,}200}$$

$$= 3.42 \text{ ft.}$$

The required volume, V, and weight, W, of the concrete in each corner foundation is:

$$V = \frac{H}{81}(B + \sqrt{B \times b} + b)$$

$$= \frac{3.42}{81}(37.11 + \sqrt{37.11 \times 1.193} + 1.193)$$

$$= 3.49 \text{ yd.}$$

$$W = V \times 4{,}000 = 349 \times 4{,}000$$

$$= 13{,}960 \text{ lb.}$$

Pouring concrete.—Correct pouring of concrete is important to secure a good foundation for oil-field equipment. Forms are first constructed according to plans submitted by equipment-supply companies or by the engineers themselves, and all dimensional measurements carefully checked. All debris and water are removed from the areas receiving the concrete and all forms are thoroughly wetted. Then, the concrete slurry is thoroughly mixed and poured. Constant supervision is necessary to see that the forms are completely filled and to prevent the pouring of all the concrete at one point, and trusting to luck that it will flow into all the corners by its own weight. Light spading of the mix next to the forms prevents honeycombing effects and improves the surface of the concrete. As soon as the concrete has taken its initial set, the surface may be troweled to produce a hard, dense, smooth surface which adds greatly to the appearance of concrete blocks and concrete floors.

Curing concrete.—Method of curing concrete is essentially devising means to prevent the evaporation of excess water. In some cases, the surface is sealed with a waterproofing compound immediately after it is set. But more commonly, it is wetted and covered with wet burlap. The concrete needs to be covered as soon as possible without marring the surface and care is taken to keep the burlap continuously wet by frequent sprinkling. All exposed surfaces are protected from drying during 4 days to secure best results.

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Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

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Natural Gas

Louisville's Petition for Rate Inquiry Refused

WASHINGTON. — Federal Power Commission has denied a petition from the city of Louisville for an investigation of rates for natural gas sold by Kentucky West Virginia Gas Co. to Louisville Gas & Electric Co. for distribution to Louisville consumers. The petition was dismissed because "the commission has no jurisdiction to investigate and determine the cost of production and transportation of the natural gas," since it is not transported in interstate commerce.

Gas Production of Direct Interest to 140,000

WASHINGTON. — Production of natural gas is of direct interest to approximately 140,000 persons, according to a survey conducted by Independent Natural Gas Association of America. Of 270 questionnaires sent to individuals and companies purchasing gas, 230 replies show they obtain gas from 11,074 producers and pay royalty to 129,328 royalty holders.

The association has adopted the following policy program:

1. Domestic oil and gas producers should be encouraged to explore for oil and develop oil and gas resources of the United States.

2. Regulation of oil and gas production should be carried out through adequate state conservation laws effectively and equitably enforced by state regulatory bodies.

3. Efforts to extend federal jurisdiction back of the point where interstate commerce actually begins should be opposed. Jurisdiction over end use of gas should not be conferred on a federal bureau. The utility principle of regulation is not and cannot be adapted to gas producing and gathering business.

Louisiana's Gas-Proration Hearing Is Postponed

BATON ROUGE.—The hearing to be conducted in New Orleans by the Louisiana Conservation Department on the feasibility of prorating the state's natural gas has been postponed from December 17 to January 17. Conservation Commissioner Joseph L. McHugh said the previously announced date conflicts with a Federal Power Commission investigation in Dallas of the natural gas industry.

Natural Gasoline

Warren Building Plant Near Wichita Falls

Warren Petroleum Corp. has started construction of a natural-gasoline plant near Wichita Falls, Tex., to process 12,000,000 cu. ft. of wet gas daily, with a daily output of 60,000 gal. Products will include pure propane as liquefied petroleum (bottled) gas and butane-propane mixtures for domestic use, along with various fractions of natural gasoline.

Some 400 wells are to be connected to the system, and it is planned to repressure the area with all excess gas, if necessary arrangements can be made with operators. Water will be obtained from the Wichita Falls water system. J. F. Pritchard & Co. are contractors.

I.C.C. Postpones Effective Date of Its Rate Order

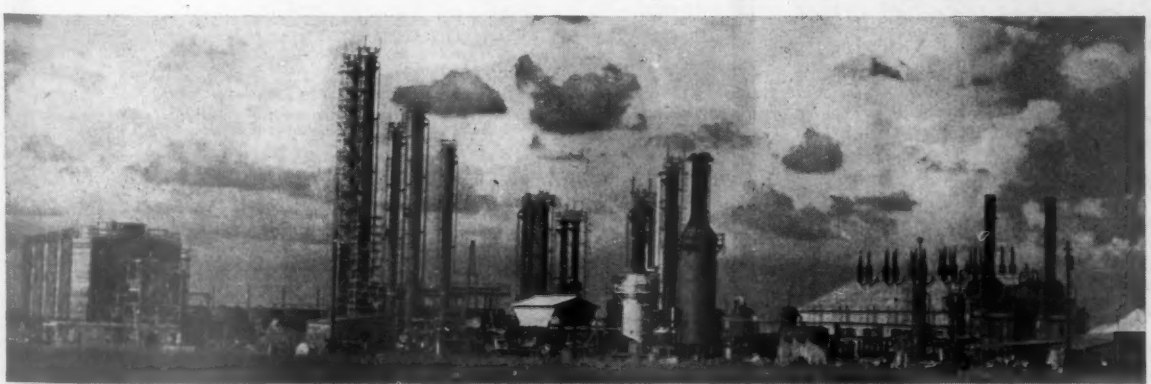
WASHINGTON.—Interstate Commerce Commission has postponed until January 11 the effective date of its order in the case involving rates on movement of liquefied petroleum gas in the South and Southwest. The commission's order in the case, issued September 11, 1944, was to have taken effect Dec. 11.

Consolidated Builds Tanks For Storing Propane

NEW YORK.—Consolidated Edison Co. of New York, Inc., is constructing 14 tanks for storing propane at its Hunts Point station, to add 10,000,000 cu. ft. of gas daily to the system's capacity.

The propane facilities will be used solely for the few days in winter when cold weather brings gas demand close to the capacity of gas-manufacturing plants. Propane is considered the cheapest method of increasing gas supplies for emergencies. Available at oil refineries, it can be mixed with manufactured gas and it is easy to store.

Consolidated Edison is spending $400,000 to install storage tanks.



A gasoline-recovery plant to process 85,000,000 cu. ft. of natural gas from the McCarthy field, near Winnie, Tex., is being built by McCarthy Oil Co. of Houston. This plant, employing about 40 men, is expected to be in operation very soon. It will recover butane and isobutane, butane-propane mixtures for liquefied petroleum gas, isopentane, motor fuel, kerosene, and fuel oil. It will cost about $4,000,000, and the stripped gas will serve industrial plants in the Jefferson company area, including the du Pont nylon salt plant in Orange County

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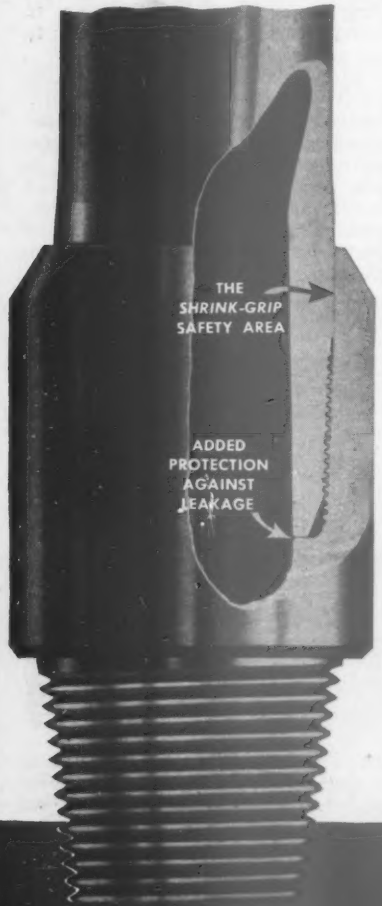
The Reed Super Shrink-Grip Tool Joint has all of the advantages of the Reed Shrink-Grip "Safety Area" design, plus the advantages of field application, anywhere, by hand. No gauging of the pipe and tool joint is necessary as a gauging shoulder is provided within the tool joint upon which the end of the drill pipe lands. This shoulder assures proper make-up and also affords an added seal and protection against leakage and failure.

All threads have a wide, flat crest and root and all tool joint pin and box threads are threaded on a common axis to assure dependable axial alignment. This is extremely important as torsional stresses are greatly reduced and the hazards of costly failures minimized.



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FULL HOLE

SIZE	Tool Joint Dia. O.D.	Tool Joint Dia. I.D.	Tool Joint Length Approx.	Diameter of Upset Drill Pipe: Diameter of Land	Diameter of Upset Drill Pipe: Inside Diameter
*2⅞"	4"	1⅞"	17"	3"	1 11/16"
3½"	4⅝"	‡2 1/16"	18"	3⅝"	2⅛"
4"	5¼"	2 11/16"	20"	4¼"	2 11/16"
4½"	5¾"	†3"	20"	4⅝"	3 1/16"
5 1/16"	7"	**3 11/16"	22"	5 11/16"	4"
6⅝"	8"	5"	24"	6¾"	5"

Note: Acme Full Hole can be Furnished in Sizes: 3½"–4½" and 5 1/16".
* Reed Full Hole, Not A.P.I. Standard. † 2 11/16" or 3 1/16" Optional.
** 4" Optional. ‡ 1⅞" Optional.

SEMI-INTERNAL FLUSH

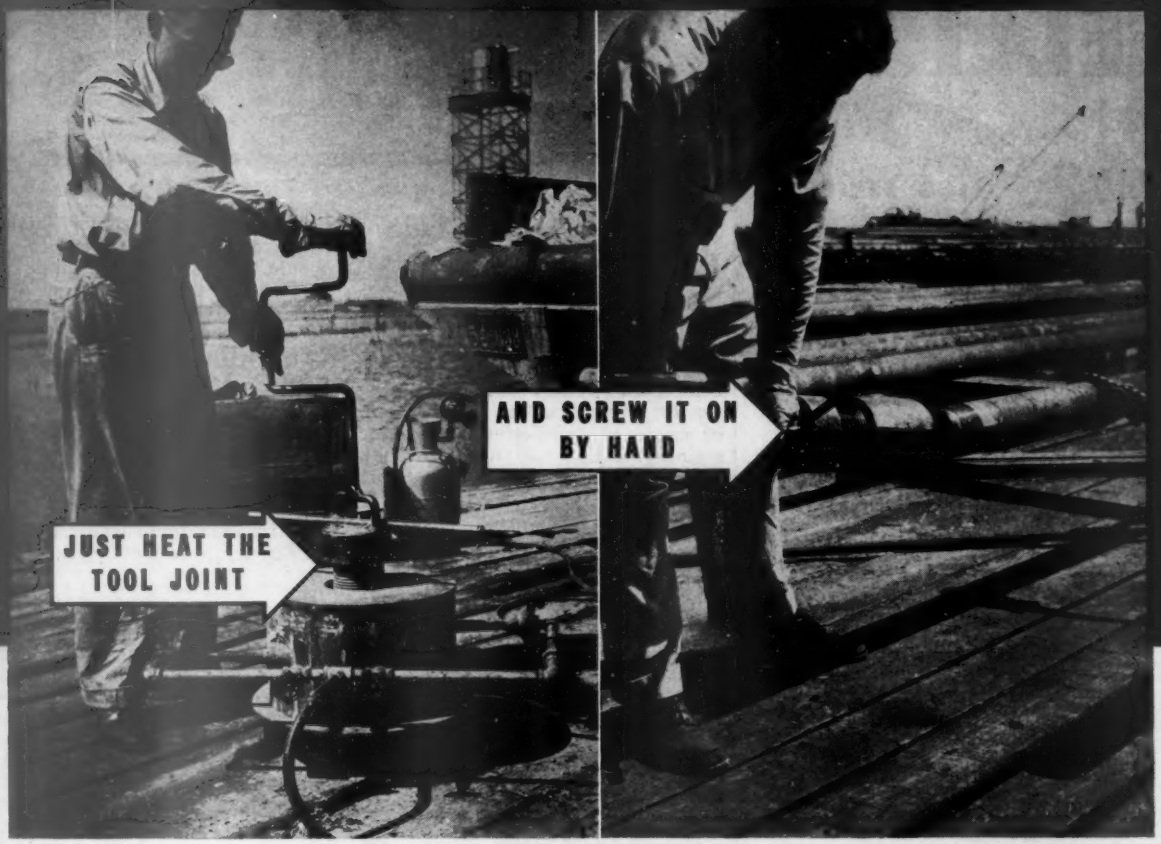
SIZE	Tool Joint Dia. O.D.	Tool Joint Dia. I.D.	Tool Joint Length Approx.	Diameter of Upset Drill Pipe: Diameter of Land	Diameter of Upset Drill Pipe: Inside Diameter
3½"	4⅞"	2 1/16"	18"	3⅝"	2⅛"
4½"	6"	3 1/16"	20"	4⅝"	3 1/16"

Note: The Tool Joint Box and Pin Connections have 4 A.P.I. Threads per Inch, with Larger Pin Diameter than A.P.I. Full Hole.

REED *Super Shrink-Grip* TOOL JOINTS FOR INTERNAL FLUSH DRILL PIPE

SIZE	Tool Joint Dia. O.D.	Tool Joint Dia. I.D.	Tool Joint Length Approx.	Diameter of Upset Drill Pipe
2⅜"	4⅛"	2⅛"	17"	3¼"
3½"	4⅝"	2 11/16"	18"	3⅝"
4"	5⅛"	†3"	20"	4⅝"
4½"	6⅛"	3¼"	20"	5 1/16"
5 1/16"	7⅛"	4 11/16"	22"	6⅛"
6⅝"	8½"	5 11/16"	24"	7 1/16"

† 2 11/16" or 3 1/16" Optional.



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Tool joints may be applied or replaced on any location by hand.

When desirable, Reed Super Shrink-Grip Tool Joints may be removed undamaged from old drill pipe and reapplied to new pipe. Full information on this procedure can be had by contacting a Reed representative or by writing the home office.

REED ROLLER BIT COMPANY

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REFINING

Frontier to Process Crude For Carter at Cheyenne

CHEYENNE, Wyo. — The Carter Oil Co., which recently purchased control of Powerine Co., distributor in the Rocky Mountain area, has contracted with Frontier Refining Co. for the processing of 1,000 bbl. of crude at the latter's Cheyenne refinery. Crude will move through Rocky Mountain Pipe Line Co.'s line.

Freight Committees Hear Plea for Rate Reduction

ST. LOUIS.—Arguments on Cosden Petroleum Corp.'s application for a reduction of 8 cents per 100 lb. in the rate charged for shipping gasoline by tank car were heard last week by the rate committee of the Southwest Freight Bureau and a committee representing western trunk lines.

Douglas Orme, traffic manager for Cosden, whose principal offices are in Big Spring, Tex., led discussion of the application, which was supported by independent oil refineries of the Southwest.

One of the company's chief arguments for lower rates in shipments from the Mid-Continent area to the Middle West was that rail transportation should be more in line with existing pipe-line rates.

The requested 8-cent reduction represents a 20-23 per cent cut from present rates, it was said. The hearing was held for benefit of the railroads, to which the information obtained will be given.

Refiners and Union to Get Proposals for Settlement

WASHINGTON. — Proposals for settlement of the labor dispute which caused the Navy to seize 53 refineries October 5, were formulated last week at a conference of administration department heads. These proposals, it was said, were to be submitted to both sides in the controversy.

H. Struve Hensel, assistant secretary of the Navy, urged that the Navy be relieved of its responsibility as soon as possible. John Steelman, special assistant to President Truman, declared that the dispute, growing out of the demand of the Oil Workers International Union for a wage increase of 30 per cent, should be settled promptly. He pointed out that government operation of the refineries was drawing upon the Navy's personnel just at a time when many of its service men were being discharged.

Government representatives at the conference besides Hensel and Steelman included Lewis Schwellenbach, secretary of labor; Vice Adm. Ben Moreell, administrative head of the seized refineries; John C. Collet, stabilization administrator, and John W. Snyder, war mobilizer.

California Asphalt Awards Contracts for Plant

SAN FRANCISCO. — California Asphalt Corp., subsidiary of Standard Oil Co. of California, has awarded contracts for construction of its new asphalt plant at Willbridge, Ore. Fluor Corp., Los Angeles, received the contract for installation of process equipment and Chicago Bridge & Iron Co., Chicago, the contract for tankage construction.

Reargument of Champlin Suit Ordered by Court

WASHINGTON. — U. S. Supreme Court has ordered reargument of a suit in which Champlin Refining

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Co., Enid, Okla., is contesting a lower court decision holding it subject to the authority of Interstate Commerce Commission. The court heard the case November 8-9. No reason for reargument was given.

Champlin's appeal from the ruling by the Western Oklahoma Federal District Court was granted last term. The company, which operates a pipe line between Enid and Rock Rapids, Iowa, is contesting an ICC order requiring it to file certificates of valuation.

Vast Market for Lubricant Additives Is Predicted

BEAUMONT, Tex.—A market for lubricating-oil additives approximating $100,000,000 annually will be witnessed within the next 3 to 5 years, Dr. P. V. Keyser, Jr., research director of the Socony-Vacuum Oil Co. laboratories at Paulsboro, N. J., predicted at a meeting here of the Texas-Louisiana section of American Chemical Society.

Through the practice of adding small quantities of chemical agents developed by wartime research, Dr. Keyser said, new, longer-lasting motor oils will enable automobile engines to run smoothly even in extreme heat or cold. He pointed out that research with petroleum additives has produced better fuels, and better oils for airplane and diesel engines.

"During the war," the research director said, "all-purpose heavy duty oils were developed suitable for use in either automotive or diesel engines. These new heavy-duty oils will be the postwar premium oils offered for automotive service by most oil companies."

Chemical compounds added to these oils, said Dr. Keyser, keep a clean engine clean, lengthen the time an oil can be used before bearing corrosion or excessive sludge formation occurs, keep the oil fluid at low temperatures, and permit gears and bearings to operate under very heavy load or at high temperatures.

Some new oils also contain antifoaming additives to prevent blocking of oil lines, and viscosity index improvers which prevent an oil of proper viscosity at engine temperature from becoming too thick to pump under winter conditions.

The new motor oil detergents, Dr. Keyser noted, "are not detergents in the sense of soap, since for the most part they do not clean dirty engines, but rather they keep clean engines clean. They appear to function partly by preventing the formation of carbon and sludge and partly by keeping any solid which does form suspended in the oil."

Ceiling Prices for Heavy Residual Fuel Reduced

WASHINGTON. — Wholesale ceiling prices for heavy residual fuel oils at principal Atlantic coast ports have been reduced 1 to 5 cents a barrel by Office of Price Administration. The reductions, effective November 28, are made possible by a recent reduction in tanker transportation rates from the Texas Gulf Coast.

The ceilings reduced are those on sales in wholesale quantities by refiners and terminal operators to industrial users. These oils are not sold in retail quantities. The ports involved are Portland, Me.; Portsmouth, N. H.; Boston and Fall River, Mass.; Providence and Tiverton, R. I.; New Haven, Conn.; Albany and New York; Philadelphia; Baltimore; Norfolk, Va.; Wilmington, Del.; Charleston, N. C.; Savannah, Ga.; Jacksonville, Fla.

At the same time specific ceiling prices at all levels of distribution have been established on petroleum fractions sold for use as pressure appliance fuel in California, Arizona, Nevada, Oregon and Washington. The ceilings are based on the principal marketer's (reference seller) price for 73-octane aviation gasoline. The general level of prices heretofore in effect will not be changed.

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Abadan, South Iran, site of this huge Anglo-Iranian Oil Company refinery, is in one of the world's most important producing areas.

In 1936 Badger designed and supplied a crude topping and vacuum unit rated at 71,000 bbls. per day of crude charge. So satisfactory was the performance that three more were purchased in 1937, 1939 and 1945, respectively. Thanks to the close co-operation with the refinery technicians which Badger engineers always strive to achieve, these units have all consistently operated at up to 86,000 bbls. per day crude input with closer cutting than ever. BADGER KEEPS ON TOP.

The aggregate crude run by these four units since commissioning exceeds—

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Badger designing, constructing and erecting experience covers the entire range of distillation units—from largest to smallest. Badger knows how to modernize or replace older types of units toward obtaining more close-cut fractions—thus broadening the refiner's stocks for profitable specialized purposes.

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Photo courtesy Anglo-Iranian Oil Co.

The largest refinery in existence now operates four Badger-designed topping and vacuum units

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SPEED: Complete cut and bevel can be made on 12 inch pipe in about 2 minutes.

ECONOMY: Save approximately one-half labor and gas costs.

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PIPE LINES

Expansion Planned for Chicago Gas Systems

Natural Gas Pipeline Co. of America, Texoma Natural Gas Co., and Chicago District Pipe Line Co. have applied to Federal Power Commission for permits to expand facilities in order to increase deliveries of gas from the Panhandle of Texas. FPC has scheduled a hearing on the matter in Washington, D. C., December 10.

The proposed constructions by Natural Gas Pipeline and Texoma, estimated to cost $18,000,000, would enable the two companies, which are operated as one system, to increase their natural gas delivery capacity from the present 268,000,000 cu. ft. a day to 349,000,000 cu. ft. in order to serve a number of Iowa and Illinois communities not now served as well as to increase deliveries to Chicago District Pipeline Co. The facilities proposed by Chicago District, estimated to cost $1,425,000, will enable it to receive additional quantities of gas from Natural Gas Pipeline Co. Since the second application is contingent upon the granting of the first, the two applications have been consolidated for the purpose of hearing.

The principal facilities proposed to be constructed by the three companies are:

Natural Gas Pipeline Co.: Loops or additional sections of pipe line parallel to its original 24-in. pipe line, where such loops are not now installed, totaling 285 miles of 26-in.; 52 miles of 24-in. on the northern end of the system; the completion of a 20-in. line extending about 20 miles north from Garden Prairie, Ill.; about 26 miles of 16-in. and 12-in. lateral extending easterly to Volo, Ill., and thence to Grays Lake, Ill. At Volo, gas will be taken into the local distribution system of Public Service Co. of Northern Illinois, and at Grays Lake into the local distribution system of North Shore Gas Co.

Texoma Co.: Four 1,250-hp. engines at its Station No. 22 in the Panhandle field, increasing the installed compressor capacity from 4,000 to 9,000 hp., enlargement of the dehydration and natural gasoline plant facilities at the station, and construction of about 26 miles of 26-in. to loop its present 24-in. pipe line along the northerly portion of its transportation system.

The applicants propose to sell gas to distributing companies for resale in the following communities not now served: In Iowa—Creston and Washington; in Illinois — Mendota, Rockford, Freeport, Pecatonia, Winnetka, Glencoe, Deerfield, Highland Park, Bannockburn, Highwood, Lake Forest, Lake Bluff, North Chicago, Waukegan, Zion, Winthrop Harbor, Rosecrans, Wadsworth, Russell, Gurnee, Gages Lake, Grays Lake, Libertyville, Mundelein, Diamond Lake, Half Day, Prairie View, Aptakistic and Rondout.

Chicago District Pipeline Co.: Two sections of 24-in. pipe line aggregating about 23 miles in length paralleling two sections of Chicago District's so-called Crawford line in Will, Cook and Dupage counties, Illinois, and additional appurtenant facilities, and to serve Public Service Co. of Northern Illinois at a new point of delivery near Volo. The application states that this would increase the capacity of the line from 140,000 a day to 220,000 M.c.f., which

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amount is necessary to meet its present demands in Chicago, and a number of smaller Illinois and Indiana communities to which it supplies gas at wholesale for retail distribution.

Tennessee G. & T. Co. Plans $2,260,442 Program

Two applications by Tennessee Gas & Transmission Co. for authority to construct and operate additional facilities have been consolidated by Federal Power Commission for presentation together before the commission in Washington, November 26.

One application requests authority to construct approximately 95 miles of 16-in. pipe line from the San Salvador field in Hidalgo County, Texas, to connect with the company's main trunk line extending from the Agua Dulce field, near Corpus Christi, to Tennessee and the Appalachian region. The cost of this line is estimated at $2,260,442.

The other application calls for a connection between Tennessee's main line and United Gas Pipe Line Co.'s Katy-Satsuma line in Harris County, Texas. To do this, 2,380 ft. of 8-in. pipe would be used. This latter line will be known as a "standby," i.e., an emergency line for use as occasion warrants.

The proposed facilities would have capacity for transmitting 99,400,000 cu. ft. from the San Salvador field and 50,000,000 cu. ft. from the Katy field.

New Williams Brothers Firm for South America

A new organization has been incorporated in Delaware known as Williams Brothers Co. This company has been formed for carrying on construction work in South America. Most of the officers are the same as those of Williams Brothers Corp. Of Williams Brothers Co. S. Miller Williams, Jr., is president; David R. Williams and Guy S. Connors, vice presidents; Cecil A. Stanfield, vice president and treasurer; J. W. Middleton, secretary. The new company has been recently domiciled in Venezuela and will be domiciled in other countries when the operations of the firm are extended. At present operations in Venezuela are being handled from the office at Puerto la Cruz. Later an office will be opened at Caracas. Shipments of construction equipment have gone from New Orleans to Puerto la Cruz recently.

Texas Group Proposes To Buy WEP Lines

A group of Texas oil men headed by Harold D. Byrd of Dallas, who seek to buy the big-inch and little-inch pipe lines of War Emergency Pipelines, Inc. appeared at the hearing of a Senate committee in Washington, D. C., and awaited their turn to testify.

The pipe lines would be bought, according to their plans, by an organization which is to be incorporated within a few days as a farmers' cooperative by a group of independent oil operators and land owners in Texas including E. B. Germany, L. M. Glasco, and W. L. Pickens. The name of the organization which has been discussed is "Independent Petroleum Cooperative Association."

Comet Gets Permit for Hamilton Field Outlet

A permit for a 22½-mile pipe line from the Hamilton field, Hot Springs County, Wyoming, to Thermopolis, has been granted to Dr. J. H. Miller, of Denver, by Wyoming Public Service Commission. The permit has been assigned to the Comet Refining Co., of which D. R. Bumford, of Minneapolis, is a director, and contract has been awarded to Pepper Tank & Construction Co.

PIPELINE "Know-how"

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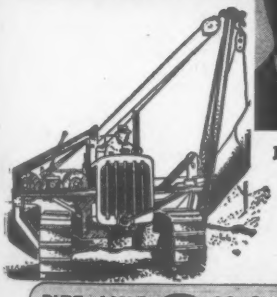

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Double Reduction - Twin Crank

Pumper Structure Capacity, 18,800 lbs.

Crank Stroke	24" - 34" - 44" - 54"
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Overall Width	3' 11"

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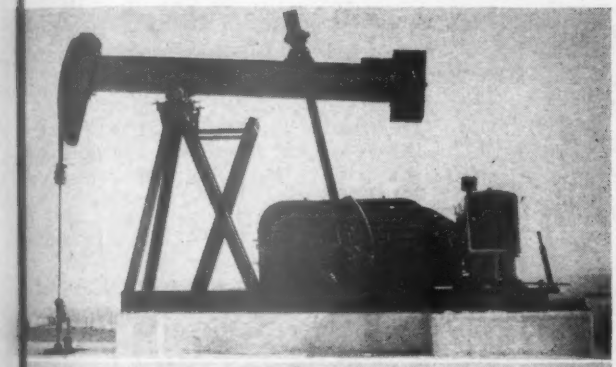

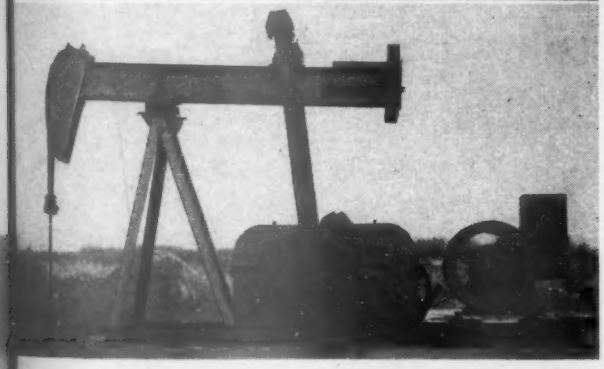

14DT69 — 69,500 Inch Pounds Torque

Double Reduction — Twin Crank

Pumper Structure Capacity	11,800 lbs.
Crank Stroke	24" - 30" - 36" - 42"
Overall Height	11' 2⅛"
Overall Length	15' 3¼"
Overall Width	3' 4⅝"

9DT45 — 45,250 Inch Pounds Torque

Double Reduction — Twin Crank

Pumper Structure Capacity	8,700 lbs.
Crank Stroke	18" - 24" - 30" - 36"
Overall Height	10' 3⅞"
Overall Length	13' 7-5/16"
Overall Width	3' 4⅝"

Lee C. Moore Chain Driven Pumping Units deliver "fool-proof' operation. A patented chain adjustment device permits accurate adjustment of the chain in the field. And in event of failure it's easier and cheaper to replace a link in the chain than to replace a gear. Where required, it's economy to use Lee C. Moore STROKE POSTS and PUMPING SUBSTRUCTURES.

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FIVE YEARS OF ROTARY DRIVE SUCCESS with DIAMOND Roller Chains

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- Smoother Flow of Power
- Less Operation Noise
- Life of Guards Prolonged
- Greater Drive Sprocket Utility

These factors, contributed by DIAMOND Roller Chain Drives, add to operating efficiency and create economies that contribute much to the success of any drilling project.

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475 Kentucky Avenue
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Tulsa Office:
2238 Terwilleger Blvd.

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KIOWA DRILLING COMPANY, INC.
717 UNIO[illegible] BLDG.
W[illegible], KANSAS

September 19, 1945

Diamond Chain Manufacturing Co.
2238 South Terwilleger
Tulsa, Oklahoma

Gentlemen:

Attention: Mr. John L. Wamsley
Factory Representative

In reply to your inquiry we have been using the high speed Diamond roller chain for our rotary drives for the past five years. We have found it to be very satisfactory.

On the average it has been giving us twice as much service as we were getting from the No. 3 API chain. In addition to the better performance in wear it also gives a much smoother flow of power. It runs with much less slapping and banging against the guards which prolongs the life of the guards and contributes materially to reducing noise of operation. We are also getting better wear from the drive sprockets than from the old type.

We are pleased to submit this information and will be glad to give you any additional facts pertaining to our operations that you may desire.

Very truly yours,

KIOWA DRILLING COMPANY, INC.

By A. J. Boundy

Illustration of Unit Rig used by Kiowa Drilling Company, Inc. Diamond Roller Chain used for Rotary Table Drive—and all rig drives.

DIAMOND ROLLER CHAINS

Improve Rotary Drive Operations

Exploration and Drilling

Week's Highlights

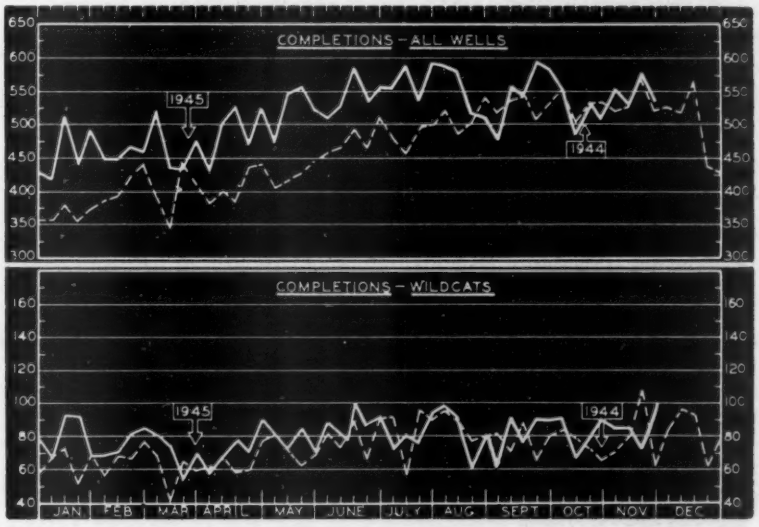
POSSIBILITIES of high gravity oil in the Cambrian, in a rim structure of the Big Horn basin is centering interest on the Rocky Mountain area again this week.

Pacific Western Oil Co. 5 Connagahan, SW SW SE 29-51n-100w, a deep test in the Oregon Basin field, on the west side of the Big Horn basin, is reported to have logged the top of the Deadwood (Cambrian) at 5,247 ft., and to have encountered saturated sand beginning at 6,280 ft. Cores were taken at 6,339-43 ft., 6,348-54 ft., 6,354-69 ft., 6,369-88 ft., and last reported coring at 6,288-90 ft.

The cores contain sand with good porosity and permeability, appearing to be saturated with high-gravity crude, not condensate, with good odor. Top of the granite is reported expected at 6,418 ft., and there appears to be some doubt whether drilling will be continued to the granite, barring the appearance of water, or whether to stop and make a drill-stem test.

The well is believed to be about 250-300 ft. below the crest of the structure on the South Oregon Basin dome. If proper estimates for shifting of the axis of the structure with depth, if any, have been made, this thickness of sand may indicate that a large portion of the structure is covered with a sandy phase of the Deadwood (Cambrian) formation.

The Oregon Basin field is a rim structure in the Big Horn basin, on which oil was discovered in



Solid line charts current weekly completions—service wells included

WEEKLY WELL COMPLETIONS . . . WEEK ENDED NOVEMBER 24, 1945

	Total of all wells					Cum. to date		Wildcat completions and discoveries					Cumulative total, 1945				
	Comp.	Oil	Gas	Dry	Footage	1945	1944	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	28	14	0	*14	41,127	1,327	1,459	0	0	0	0	0	0	0	0	0	0
Pennsylvania	69	31	4	†34	127,576	3,650	3,830	0	0	0	0	0	0	0	0	0	0
West Virginia	18	4	11	3	44,775	727	822	0	0	0	0	0	0	0	0	0	0
Ohio	25	3	14	8	63,718	894	919	0	0	0	2	2	0	0	14	57	71
Indiana	5	2	0	3	9,332	177	232	0	0	0	1	1	7	0	0	25	32
Kentucky	14	6	1	7	29,743	513	674	0	0	0	2	2	23	0	4	48	75
Illinois	38	19	0	19	94,541	1,635	1,756	1	0	0	9	10	49	0	0	288	337
Michigan	10	2	0	8	24,151	681	616	0	0	0	6	6	11	0	4	256	271
Kansas	38	13	7	18	125,770	1,572	1,673	0	0	1	11	12	33	0	14	310	357
Neb., Mo., Iowa	8	0	1	7	12,489	28	35	0	0	0	4	4	0	0	0	18	18
Oklahoma	45	24	4	17	181,481	2,159	1,666	0	0	2	6	8	76	3	18	319	416
Texas	131	64	11	56	626,810	6,453	5,088	6	1	3	34	44	191	15	53	1,149	1,408
North Central	39	12	1	26	120,712	1,960	1,336	0	0	0	13	13	70	0	5	406	481
West	36	25	0	11	190,043	1,583	1,437	4	0	0	8	12	51	1	0	231	283
Panhandle	2	0	2	0	6,188	495	264	0	0	0	0	0	0	0	1	6	7
Eastern	10	4	2	4	49,434	339	290	0	0	0	3	3	6	8	2	78	94
Gulf Coast	33	20	3	10	219,458	1,507	1,143	2	1	1	6	10	50	5	34	262	351
Southwest	11	3	3	5	40,975	469	618	0	0	2	4	6	14	1	11	166	192
Louisiana	26	14	2	10	114,555	982	733	0	0	0	1	1	31	4	6	113	154
Northern	20	12	2	6	61,064	422	296	0	0	0	1	1	8	1	6	66	81
Southern	6	2	0	4	53,491	560	437	0	0	0	0	0	23	3	0	47	73
Arkansas	0	0	0	0	0	160	197	0	0	0	0	0	2	0	0	34	36
Mississippi	9	4	0	5	56,186	333	136	0	0	0	4	4	6	0	0	112	118
Southeastern States	1	0	0	1	2,596	54	46	0	0	0	0	0	1	0	1	35	37
Montana	10	8	1	1	21,755	292	319	0	0	0	0	0	10	0	0	24	34
Wyoming	10	5	3	2	41,571	205	158	0	0	0	1	1	18	0	1	44	63
Colorado	1	1	0	0	5,578	51	31	0	0	0	0	0	1	0	1	11	13
New Mexico	4	2	1	1	27,587	377	360	0	0	0	0	0	10	0	6	59	75
California	41	29	3	9	151,686	2,030	1,807	0	0	0	5	5	4	0	2	213	219
Total United States	531	245	63	223	1,803,027	24,300	22,557	7	1	6	86	100	473	22	124	3,115	3,734
Total previous week	578	304	91	183	2,034,341	23,769	22,023	7	1	2	61	71	466	21	118	3,029	3,634
Total Nov. 25, 1944	526	278	67	181	1,637,866	22,557	16,119	8	0	1	52	61	408	26	112	2,919	3,465

Service wells included: *14; †31.

1927. The cumulative production to date is almost 34 million barrels, with current daily output of 10,500 bbl. of 21° gravity oil from 148 wells in the Embar, Tensleep, and Madison.

If the new pay proves prolific, and also high gravity, sweet crude, many of the rim structures of the Wyoming basins will see still another drilling campaign. The Cambrian has never been considered a likely source of oil, and the tendency is for all oils below the Jurassic to be black oil, low gravity, high sulfur content, low in price. Cambrian, light oil production in appreciable quantities would therefore call for a reevaluation of the deep prospects of rim structures over a wide area.

APPALACHIAN FIELD

Southeast Ohio Has Deep Oil Show

PITTSBURGH.—In southeast Ohio, Knox Township, Columbiana County, NE Sec. 23, where the latest Oriskany gas pool has been developed, Ohio Oil Co. drilled a deep test on S. L. Sturgeon farm. At 5,392 ft. in the White Medina, it had a showing of 12 bbl. a day of amber-colored oil, no gas. It is bottomed at 5,543 ft. and the oil is being bailed for test. This is the deepest oil showing in the state.

In the Baileysville district, Wyoming County, West Virginia, Godfrey L. Cabot, Inc. completed No. 1,185 Shields with a final gage of 3,499,000 cu .ft. gas, natural, from the Berea, at total depth 3,567 ft. In the Birch district, Braxton County, Creek Yoak et al completed a test on Hopkins & Fisher lease in the Big Lime and Injun sand, showing for 50 bbl. and 75,000 cu. ft. gas, total depth 2,165 ft. In the Laurel Hill district, Lincoln County, Roy & McComas completed No. 3 Hans Watts et al with a final gage 823,000 cu. ft. gas, total depth 3,250 ft. in brown shale.

Eighteen new locations were announced last week located in Barbour, Boone, Calhoun, Clay, Fayette, Lincoln, Logan, Nicholas, Ritchie, Roane, Upshur, and Wyoming counties.

In Washington Township, Indiana County, southwest Pennsylvania, T. W. Phillips Gas & Oil Co. completed a gasser on A. E. Elkins farm good for 3,100,000 cu. ft. from the Tiona sand, total depth 2,822 ft.

Through this area, 12 new locations were announced in Armstrong, Clarion, Fayette, Washington, and Westmorland counties.

MICHIGAN

Roscommon Field Gets 2,000-Bbl. Well

SAGINAW.—The week's operations resulted in 10 completions, 2 good oil wells and 8 dry holes. Six of the dry holes were wildcat tests. Sun Oil Co. completed a Roscommon field well for a potential of 2,040 bbl. a day and the C. L. Maguire 1-B Sisco, Coldwater field completion, flowed 400 bbl. daily, pinched back.

The slow, steady decline continues in Michigan production, the Michigan Oil and Gas Association announcing October output at 1,428,604 bbl. from 3,504 wells, an average of 40,084 bbl. daily. The Reed City field accounted for its usual 25 per cent of production, Deep River averaged 4,154 bbl. daily, and Coldwater 3,734 bbl.

Ten of the 21 new locations announced are in Arenac County's Deep River Township, three are in Van Buren County, and one each in Ottawa, Gratiot, Bay, Roscommon, Isabella, Oscoda, Muskegon and Mecosta.

MICHIGAN WILDCAT FAILURES

Allegan County, Cheshire Township: S. L. Findley 1 Kaylor communitized, SW SW SW 1-1n-14w, dry, Traverse lime, TD 1,398 ft.

Lee Township: Oil Producers, Inc. 1 Scott, NE SW SW 6-1n-15w, dry, Traverse lime, TD 1,228 ft.

Mecosta County, Hinton Township: C. W. Collin 1 Hoyt-Davis, SW NE NE 1-13n-8w, dry, Dundee, TD 3,855 ft.

Van Buren County, Pine Grove Township: Smith Petroleum Co.-James J. McGerry 1 Kolisiak, NE NE SW 21-1s-13w, dry, Traverse lime, TD 1,366 ft.

Washtenaw County, Sylvan Township: C. W. Collin 1 Whittiker, NE SE SW 20-2s-3e, dry in Traverse lime, TD 2,027 ft.

Wexford County, Cherry Grove Township: Sun Oil Co. 1 Grubbs, SE NE NW 21-21n-10w, salt water in Monroe, TD 3,922 ft.

PERMIAN BASIN

Atlantic Dual Completes Pre-Permian Pool Opener

MIDLAND.—Atlantic Refining Co. 1-A-31 University, pool opener in eastern Crane County, has been dually completed. On official test of the Devonian it flowed 774 bbl. of 47.3° gravity oil in 24 hours through a ½-in. tubing choke from perforations at 8,812-27 ft., 8,835-52 ft., and 8,860-69 ft. Gas-oil ratio was 700 to 1. It has been completed in the Ellenburger to flow 420 bbl. of 47.2° gravity oil daily through ½-in. tubing choke. Production is through perforations at 10,291-458 ft. Gas-oil ratio was 550 to 1.

Humble Oil & Refining Co. 1 G. H. Cowden, Section 35, Block X, CCSD&RGNG Survey, 1¾ miles north of the Crane-Cowden pool, southeastern Crane County, took a 32-minute drill-stem test from 8,703-40 ft. and recovered 45 ft. of drilling mud with no shows of oil, gas or water. A core from 8,780-90 ft. recovered 3 ft. of dolomite with no show. It was drilling below 8,790 ft. in dolomite. Sinclair Prairie Oil Co. will drill a diagonal northwest offset to Humble 1 Cowden to seek production in the Devonian. It is 1 G. H. Cowden, 1,980 ft. from the north and east lines of Section 35, Block X, CCSD&RGNG Survey.

The fourth pay section in the Fullerton field in northwestern Andrews County was promised by the Fullerton Oil Co. 9-A Wilson, Section 16, Block A-32, Public School Land Survey. On a 25-minute drill-stem test of the Ellenburger from 9,905-10 ft., the well flowed an estimated 75 bbl. of 38° to 40° gravity oil per hour. Total depth is 9,945 ft. Five and one-half-inch casing is being run to test the pay section. Humble 1-B fee, Section 8, Block A-24, Public School Land Survey, ⅜ mile northwest of 1 fee (M. S. Doss), opener of the Doss pool of south central Gaines County, was swabbed 5 times after being treated with acid. The well kicked off and started flowing at the rate of 7 bbl. of fluid per hour for an unreported period. The fluid was cut 3 per cent with acid water. Operator is retreating with 6,000 gal. of acid.

Ector County.—Stanolind Oil & Gas Co. 1 Jessie Mae Williamson, Section 5, Block 45, T-1-N, T&P Survey, wildcat on the west side of the Goldsmith pool, ran a 90-minute drill-stem test from 8,069-8,174 ft. There was a strong blow of air throughout the test. Recovery was 80 ft. of mud slightly cut with oil and gas. Devonian was topped at 8,045 ft. It was drilling below 8,195 ft. in lime and chert. A flush producer for the TXL field is Mid-Continent Petroleum Corp. 3-A TXL, Section 17, Block 45, T-1-S, T&P Survey, which was completed for 2,571 bbl. of 40° gravity oil daily from 7,899-8,064 ft.

Fullerton field, Andrews County, had four completions this week, TXL field.

DAILY AVERAGE PRODUCTION FOR WEEK

	Nov. 24 crude oil	Bureau of Mines demand forecast	State allowable	Nov. 17 crude oil
Alabama	550	100	.....	550
Arkansas	76,300	78,000	.....	76,050
California	845,200	860,000	880,000	832,500
Colorado	15,000	12,000	.....	15,000
Eastern	63,550	65,200	.....	61,450
Florida	100	200	.....	100
Illinois	204,100	215,000	.....	204,100
Indiana	13,500	13,500	.....	13,500
Kansas	260,250	270,000	255,000	267,350
Kentucky	28,950	28,000	.....	29,400
Louisiana	368,300	365,000	398,733	368,400
North Louisiana	74,650	.....	.....	74,750
South Louisiana	293,650	.....	.....	293,650
Michigan	46,300	47,000	.....	45,850
Mississippi	53,150	48,000	.....	54,150
Montana	22,700	23,200	.....	22,650
Nebraska	750	800	.....	750
New Mexico	101,650	102,000	104,000	101,600
Oklahoma	383,600	390,000	390,000	388,700
Texas	1,894,700	1,990,000	2,016,198	1,894,700
East Texas	316,500	.....	.....	316,500
East Central Texas	128,000	.....	.....	128,000
North Central Texas	147,100	.....	.....	147,100
Texas Panhandle	81,000	.....	.....	81,000
West Texas	457,750	.....	.....	457,750
Southwest Texas	300,100	.....	.....	300,100
Texas Gulf Coast	464,250	.....	.....	464,250
Wyoming	91,850	92,000	.....	90,700
Total United States	4,470,500	4,600,000	.....	4,467,500
Change from prev. week, up	3,000			
Total production January 1-November 24, 1945				1,538,548,425 bbl.
Same period last year				1,498,531,900 bbl.

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Norris Brothers, INC.
ROBINSON · ILLINOIS

Ector County, three, and North Ward-Estes, Ward and Winkler counties, and Slaughter field, Cochran County, had two each. Slaughter field, Hockley County, reported five new locations, Fullerton field and McCamey field, Upton County, three each and Sand Hills-Tubb field, Crane County, two.

WEST TEXAS SUCCESSFUL WILDCATS

Andrews County: New oil pay—Humble 1 J. E. Parker, Sec. 24, Blk. A-41, PSL Sur., elev. 3,325 ft., Martin pool, plugged back to 8,836 ft., flowed natural 578 bbl. day through ½-in. choke on 2-in. tubing, perf. 8,700-50 and 8,775-90 ft. McKee, gravity 42.3°, gas-oil ratio 630, TD 9,072 ft.

Extension to old oil pool: Stanolind and Continental 1-R University, Sec. 5, Blk. 9, University Lands, 1¾ mi. SE Mascho-Fuhrman pool, elev. 3,201 ft., plugged back to 4,466 ft., pumped 104 bbl. day through 2-in. tubing, perf. 4,340-4,466 ft. Grayburg, gravity 28°, gas-oil ratio 218, TD 5,539 ft.

Gaines County: New oil pool—Amerada 1-A Jones, Sec. 3, Blk. A-6, PSL Sur., 7 mi. NW Russell pool, elev. 3,699 ft., plugged back to 11,422 ft., top pay 11,181 ft. Devonian, flowed 1,014 bbl. day through 1¼-in. choke on 2-in. tubing, gravity 43.5°, gas-oil ratio 245, TD 11,635 ft.

Midland County: New oil pool—Humble 1 Mrs. O. P. Buchanan, Wm. Baldridge Sur. No. 32, Cert. 692, 9 mi. SE Midland, elev. 2,694 ft., plugged back to 10,455 ft., flowed 270 bbl. day through 11/32-in. choke on 2-in. tubing, perf. 10,374-390 ft. Strawn, gravity 45.7°, gas-oil ratio 4,350, TD 12,574 ft.

WEST TEXAS WILDCAT FAILURES

Crocket County: Lion 1 Neal, Sec. 66, Blk BB, EL&RR Sur., 5 mi. E World pool, elev. 2,613 ft., San Andres 2,465 ft., dry, TD 7,429 ft.

Garza County: Union 1-C Post estate, Sec. 29, Blk. 4, K. Aycock Sur., elev. 2,530 ft., Clear Fork 3,408 ft., dry, TD 3,446 ft.

Lynn County: Barnsdall 1 Lonnie and Billie Williams, Sec. 2, Blk. 8, ELRR Sur., 5 mi. S Tahoka, elev. 3,054 ft., San Angelo 5,120 ft., dry, TD 7,509 ft.

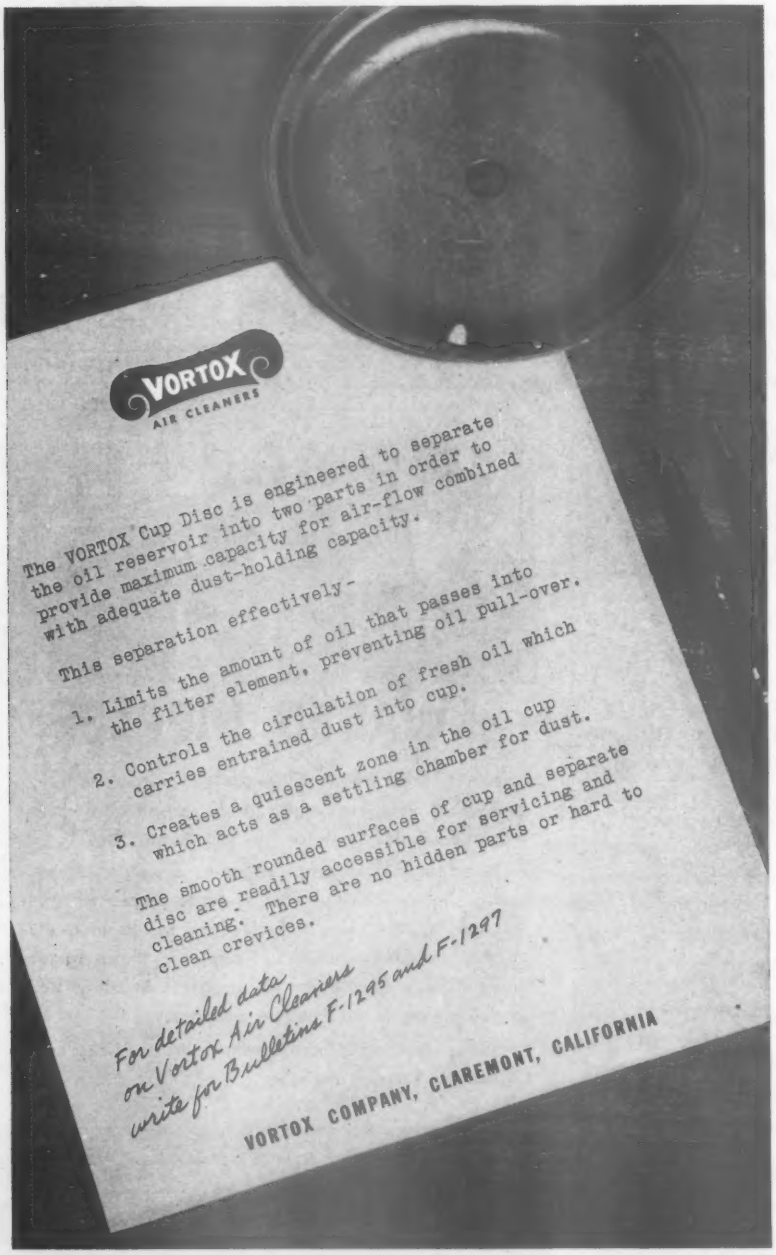
Pecos County: C. L. Carpenter 3 I. G. Yates, Sec. 55, Blk. 1, I&GN Sur., 4½ mi. S Iraan, elev. 2,237 ft., dry, TD 1,405 ft.

Ord Gary 2 University, Sec. 15, Blk. 20, University Lands, 3 mi. W Taylor-Link field, elev. 2,562 ft., dry, TD 1,373 ft.

Mack Hays 1 White & Baker, Sec. 27, Blk. 2, TCRR Sur., 2 mi. SE White & Baker pool, elev. 2,650 ft., dry, TD 1,901 ft.

Terry County: Corrigan & Crump 1 Nystel, Sec. 8, Blk. C-38 PSL Sur., 1 mi. N of NW cor. Dawson County, elev. 3,169 ft. San Andres 4,440 ft., dry, TD 5,252 ft.

Yoakum County: King, Warren & Dye 1 Irving Stewart, Sec. 382, Blk. D, J. H. Gibson, Sur., 11 mi. E and 2 mi. N Plains, elev. 3,590 ft., San Andres 4,690 ft., dry, TD 5,510 ft.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VORTOX COMPANY, CLAREMONT, CALIFORNIA

SOUTHEASTERN NEW MEXICO

HOBBS.—Southern Union Gas Co. is starting an 8,000-ft. wildcat on a 10,000-acre block in the panhandle section of Roosevelt County. It is 1 Lucas, 660 ft. from the south line and 1,980 ft. from the west line of Section 5-2n-30e, about 20 miles northwest of Portales.

Amerada Petroleum Corp. 1-PB State, 16-23s-37e, northeast offset to the Grayburg discovery in the Penrose-Skelly field, Lea County, flowed 193 bbl. of oil and 19 bbl. of basic sediment and water on a test of the Holt zone from 5,015-65 ft. Operator is tearing down drilling tools in order to take official test. Mid-Continent Petroleum Corp. has staked a 1½-mile south and slightly west outpost of the Ellenburger discovery in the Penrose-Skelly area. It is 1-A Christmas, 1,980 ft. from the south and east lines of 17-22s-37e.

Lea County had four field completions this week. Eddy County reported three new field locations and Lea County two.

SOUTH LOUISIANA

226-Bbl. Well for Bayou Sale Pool

NEW ORLEANS.—At Bayou Sale, St. Martin Parish, The Atlantic Refining Co. completed 14 St. Marys Parish Land Co., 1-17s-9e, flowing a potential of 226 bbl. of 36° gravity oil per day through a ⅛-in. choke with 1,050 lb. pressure in the tubing. Gas-oil ratio is 710 to 1. The production is through perforations at 10,148-58 ft. in the St. Mary sand, topped at 10,032 ft. Total depth is 11,320 ft., top of cement 10,255 ft. Marin sand in this test from 9,565-9,615 ft. showed salt water.

In Avoyelles Parish, Don Crosby Drilling Co. and Industrial Crude, Inc., 1 Snowden Estate, wildcat test in the Lake Latanier area, 22-3n-5e, was abandoned in the lower Wilcox. Total depth was not reported, but top of the Wilcox was at 5,010 ft. No shows were encountered.

Sohio Petroleum Co. abandoned their exploratory test, the 3 Lutcher Moore, in the Mystic (Fields) area of Beauregard Parish, 33-6s-12w, after running an electric log to total depth of 8,770 ft. No shows were indicated.

There were nine new locations reported this week, four of which are to be drilled to 10,000 ft. or more. Two wildcats are

staked, one each in Assumption and St. Tammany parishes. The six completions were in proven areas, two oil and four dry. Iberville Parish led with two completions.

N. CENTRAL TEXAS

Grayson Co. to Get Deep Ellenburger Test

WICHITA FALLS.—Standard Oil Co. of Texas will drill a 10,500-ft. Ellenburger wildcat 1½ miles northwest of Sherman in northern Grayson County. It is 1 Mitchell, 950 ft. from the southwest line and 680 ft. from the northwest line of an 83.7-acre tract, J. B. McNarr Survey, Abstract 763. Ohio Oil Co. 1 Pitchfork Land & Cattle Co., western King County wildcat 10 miles northwest of Guthrie in Block 1, Somervell County School Land Survey, is dry at 6,957 ft. in granite.

Standard 2 Beasley, J. McKerley Survey, Sivells Bend pool, Cooke County, recovered 1,420 ft. of oil on a 30-minute dril-stem test from 5,443-60 ft. It was drilling below 5,672 ft. This is a shallower pay for the pool. Mid-Continent Petroleum Corp. 1 J. V. Morris, 1 mile northeast of Sivells Bend pool, ran a 24-minute drill-stem test from 6,259-63 ft. and recovered 25 ft. of heavily oil-cut mud, 10 ft. of free oil and no water. It is drilling ahead at 6,290 ft. in shale.

Venmex Oil Co. of Texas and Aro Equipment Co. 1 Arveson, J. Smith Survey, east offset to the recent Lawson discovery of Montague County, has been completed to flow 286 bbl. of 42° gravity oil in 6 hours on official test, with gas-oil ratio of 450 to 1. A. R. Dillard 2 Lawson, N. Kimbro Survey, a north offset to the discovery, is dry at 6,396 ft. in shale.

Archer and Young counties each had secen field completions this week. Wichita County reported 16 new field locations, Archer County 7 and Young County 5.

In West Central Texas, Jones and Taylor counties each had one field completion. Jones County Regular field reported two new locations.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: N. D. Goldsmith 1 Kunkel, Blk. 12, Crawford Subd. I. Holman Sur. A-162, 2 mi. N and 5½ mi. W Olney, elev. 1,246 ft., Mississippian 5,138 ft., dry, TD 5,185 ft.

Wayne King 1 C. E. Carter, Sec. 39, Blk. 5, Clark & Plumb Sur., 3½ mi. W and 1 mi. S Archer City, dry, TD 1,210 ft.

Frank Wood 1 Vernon Brown, Sec. 2, SPRR Sur. A-921, 6 mi. S and 1½ mi. W Holliday, elev. 1,139 ft., dry, TD 1,690 ft.

Clay County: Continental 1 S. A. Donnell, Lot 65, Freestone CSL A-144, 1½ mi. S Vashti, elev. 1,098 ft., Barnett 6,482 ft., Ellenburger 6,720 ft., dry, TD 7,020 ft.

Fain-McGaha and Republic Natural Gas 1 Bryant Edwards, S. C. Belden Sur., 5½ mi. E of Henrietta, elev. 869 ft., Simpson 6,004 ft., dry. TD 6,165 ft.

Cooke County: S. D. Johnson 1 R. L. Trew, M. Langham Sur. A-364, 4 mi. S and ½ mi. E Myra, elev. 964 ft., dry, TD 1,961 ft.

Magnolia 1 A. J. Cooke, BBB&C Sur. A-179, ½ mi. S Woodbine, elev. 7,521 ft., Ellenburger 4,890 ft., dry, TD 5,007 ft.

Knox County: Youngblood & Foree 1 Ross Bates, Sec. 3, Blk. 2, D&W Sur., 2 mi. E and 2½ mi. N Goree, elev. 1,408 ft., Strawn 3,264 ft., dry, TD 4,510 ft.

Young County: Panhandle 1 Morgan, Sec. 3409, TE&L Sur., 2 mi. N and 3 mi.

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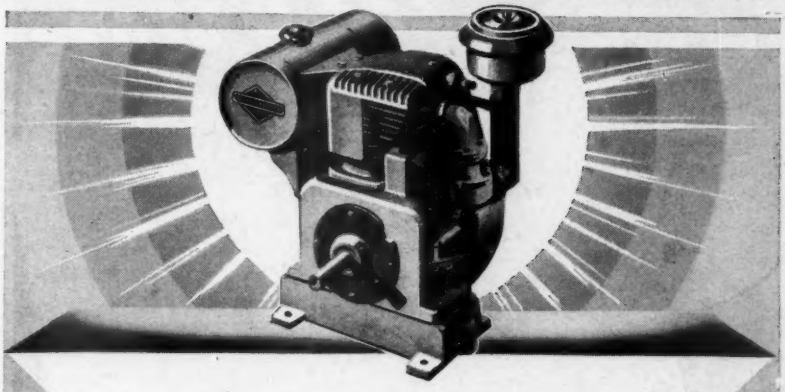

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E Murray, elev. 1,169 ft., Palo Pinto 1,723 ft., dry, TD 2,907 ft.

Dwight M. Ross 1 F. V. Hinson, Sec. 1454, TE&L Sur., 3 mi. NW Jean, elev. 1,175 ft., Mississippian 5,075 ft., dry, TD 5,151 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Parker County: Humble 1 C. K. Tompkins, Sec. 169, T&P Sur., 2 mi. W and 5½ mi. N Weatherford, Chappell 5,935 ft., Ellenburger 5,965 ft., dry, TD 7,980 ft.

Stonewall County: A. R. Dillard 1 Texas fee, Sec. 161, Blk. 1, H&TC Sur., 15 mi. NW Aspermont, dry, TD 6,120 ft.

Texas Pacific 1 M. S. Sandell, Sec. 429, Blk. D, H&TC Sur., 3½ mi. NE Jayton, dry, TD 6,837 ft.

EASTERN TEXAS

New Pay Found in Quitman Pool

DALLAS.—Shell Oil Co., Inc., 1 Atlatl-Harris, E. Goodsir Survey, on the south side of the Quitman high-gravity Paluxy sand pool of northwestern Wood County, opens a new pay for the pool. It has been completed in the Sub-Clarksville to pump 62.3 bbl. of 23° gravity oil in 24 hours on official test. Production is from perforations from 4,126-40 ft. Gas-oil ratio was 10 to 1. The well was a failure in the regular pay and it was plugged back to test the Sub-Clarksville which showed oil while being drilled. Magnolia Petroleum Co. will deepen 1 G. A. McCreight, E. Esparcia Survey, wildcat 4 miles south of Yantis in northwestern Wood. The test had been drilled to its contract depth of 6,665 ft., just below the Paluxy. It is planned to drill to the Travis Peak.

Stanolind Oil & Gas Co. 1 Cole, Taylor Survey, wildcat in the Roseborough sector of Harrison County, 9 miles south of Marshall is dry at 6,802 ft. Travis Peak was topped at 6,528 ft. Elevation is 318 ft. J. W. Murray 1 Winnie Fort, L. Peters Survey, 2 miles northeast of Hooks, Bowie County, is a failure at 3,010 ft.

Phillips Petroleum Co. 1 Carver, M. M. Long Survey, east offset to the discovery of the South Tyler field, Smith County, is estimated to be good for 8 to 10 bbl. of oil per day through perforations from 9,889-98 ft. Sinclair Prairie Oil Co. 1 Shofner, Dickerson Survey, Smackover test on the south end of the Chapel Hill structure of eastern Smith, had testing delayed again when tubing became lodged at the bottom of the hole. Total depth is 13,577 ft.

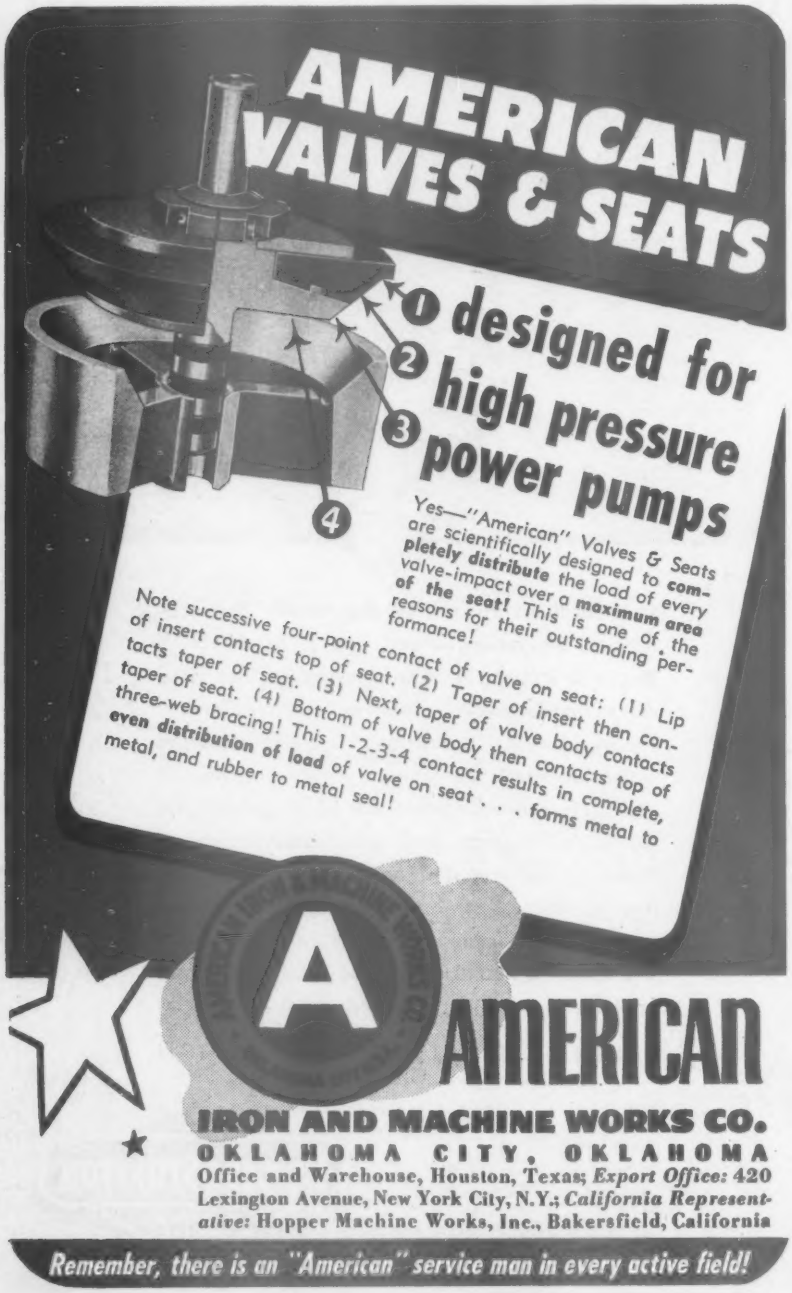
Hawkins field, Wood County, had three completions this week and Carthage field, Panola County, had two. Calvert field, Robertson County, reported two new locations.

EASTERN TEXAS WILDCAT FAILURES

Franklin County: Humble 1 Gerow, John K. Rogers Sur., 4 mi. W and ¼ mi. N Talco, elev. 321 ft., Paluxy 4,860 ft., Glen Rose 5,290 ft., dry, TD 5,504 ft.

Henderson County: Delta Drilling et al 1 Hurt & Miller, Isaac Roberts Sur., 5 mi. NW Frankston, Woodbine 5,070 ft., dry, TD 5,250 ft.

Hunt County: L. A. Helms 1 W. H. Adams, H. T. Chenowith Sur., elev. 610 ft., Paluxy 3,925 ft., dry, TD 4,535 ft.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TEXAS GULF COAST

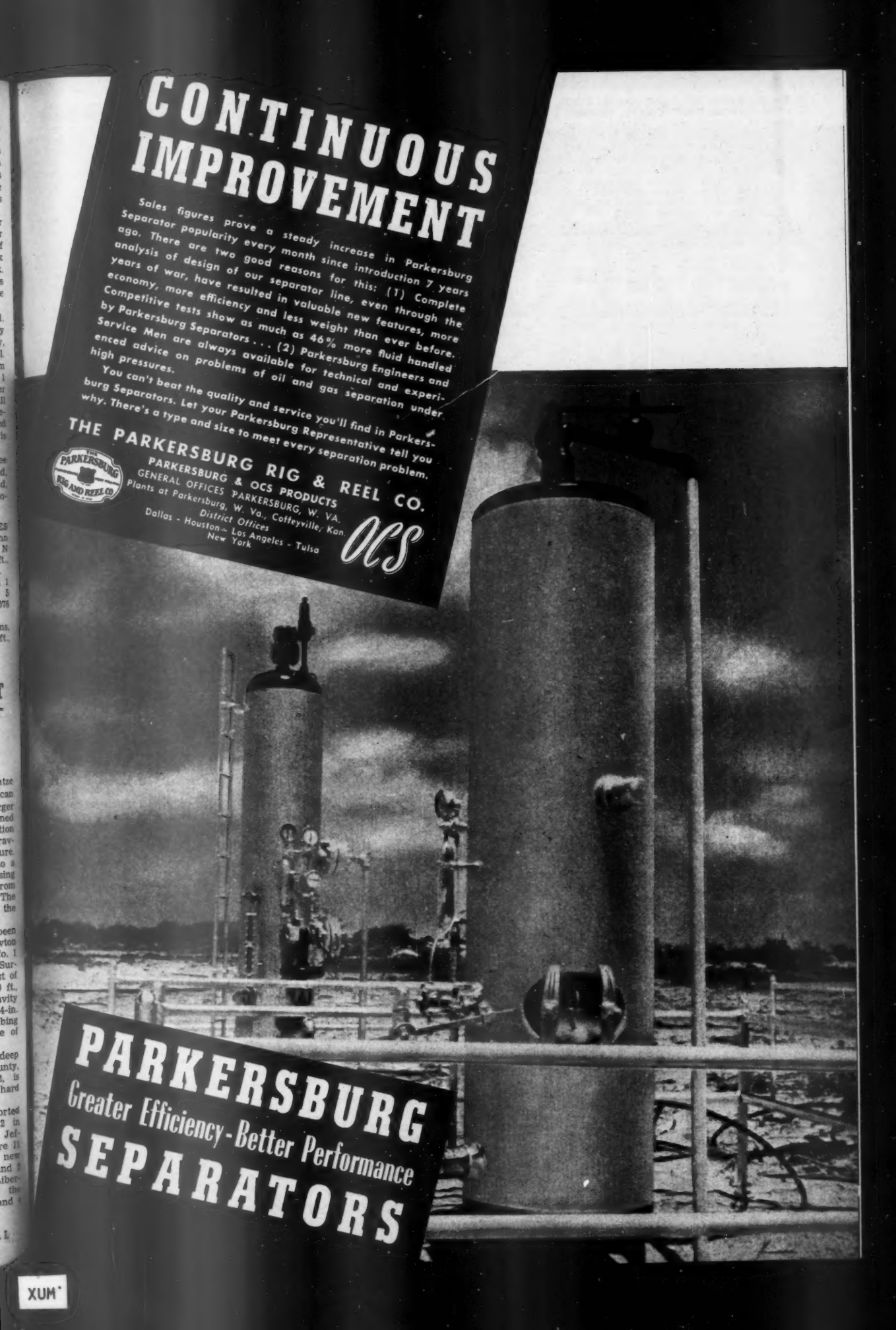
New High-Gravity Pool for Hardin County

HOUSTON.—Six miles north of Kountze in Hardin County, Pan American Production Co. 1 Olive Sternenberger Lumber Co., P. S. Watts Survey, opened a new oil pool. On a 16-hour production gage the well flowed 30 bbl. of 44° gravity oil, with 3,200 lb. tubing pressure. Gas-oil ratio is 2,742 to 1. Drilled to a total depth of 10,049 ft. with 7-in. casing set at 9,956 ft., this well is producing from open hole in the Wilcox formation. The new pool has been designated as the Kountze pool.

New condensate production has been opened in the South Call area of Newton County by Humble Oil & Refining Co. 1 E. C. Hankamer et al, J. B. Smyth Survey, Abstract 790, 12½ miles southeast of Call. Drilled to a total depth of 9,009 ft., this test flowed 80 bbl. of 62° gravity condensate per day through an 11/64-in. choke, gas-oil ratio 14,162 to 1, tubing pressure 2,575 lb. There was a trace of water in production.

Humble 10 Edward F. Milo et al, deep test in the Tomball field, Harris County, C. N. Pillott Survey, Abstract 532, is drilling ahead from 14,954 ft. in hard shale.

There are 18 new locations reported this week with 5 being wildcats, 2 in Jackson, and 1 each in Chambers, Jefferson and Polk counties. There were 11 completions including 3 wildcats, 1 new pool discovery in Newton County, and 2 dry holes, 1 each in Fort Bend and Liberty counties. Jefferson County had the most development with 3 locations and 4 completions for this week.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SUCCESSFUL WILDCAT COMPLETED IN UPPER GULF COAST TEXAS

Newton County: New condensate pool, South Call area—Humble Oil & Refining Co. 1 E. C. Hankamer et al, J. B. Smyth Survey, Abstract 790, 12½ miles southeast of Call, TD 9,009 ft., perf. with 36 holes at 7,960-66 ft., PT 80 bbl. 62° per day through an 11/64-in. choke, gas-oil ratio 14,162 to 1, TP 2,575 lb., trace of water.

WILDCAT FAILURES COMPLETED IN UPPER GULF COAST

Fort Bend County: Pure Oil Co. 1 R. F. Ransom, in Wm. Andrus League, 2 miles north of Rosenberg, dry at 8,628 ft.

Liberty County: R. Olsen Oil Co. 1 J. F. Richardson, in John Page Survey, 11 miles southeast of Liberty, dry at 8,014 ft.

CALIFORNIA

Important Wildcats Remain Unproven

LOS ANGELES.—Although the Ohio Oil Co. appears to have found a new field near Gardena, the discovery well is still held up with water trouble. Richfield Oil Corp. has an important wildcat under way in the Bandini district that looks quite promising. However, neither of these areas can be considered proven.

Standard Oil Co. of California is drilling ahead in its Leffingwell wildcat in the Santa Fe Springs-West Coyote area, total depth being below 11,000 ft., with nothing of importance reported below 10,500 ft.

With the end of the year only a month away, a review of the wildcat results to date indicates only minor discoveries, with nothing that now looks like a major strike having been opened. The greatly expanded refining capacity resulting from wartime construction will apparently be called on to supply large civilian consumption in the future, judging by gasoline consumption trends since V-J day, and by the estimates of the proportion of war swollen population that will be retained by the Pacific Coast states. As a result, there is some concern over future reserves among company officials who look ahead.

CALIFORNIA WILDCAT FAILURES

Alameda County, Livermore: Bradford & Guardino 1 B. & G., 7-3s-3e, bottomed in gray sand, TD 721 ft.

Kern County, Buttonwillow: Del Valle Gasoline Co. 1 Burnand, 5-30s-24e, bottomed in gray sand, upper Scalez, 4,510 ft., TD 4,705 ft.

Kings County, Liberty Farms: Shell 3-1 Salyer, 30-22s-22e, bottomed in barren gray sand, TD 3,700 ft.

Los Angeles County, Brea: El Rancho Exploration Co. 1 Rancho, 30-2s-9w, bottomed in gray sand, TD 405 ft.

San Luis Obispo County, Cuyama: K. & M. Drilling Co. 1 Kosanke, 17-25s-16e, bottomed in barren gray sand, TD 710 ft.

ROCKY MOUNTAIN

Frontier Sand Produces Gas at Steamboat Butte

DENVER.—The Steamboat Butte field, Fremont County, Wyoming, discovered and developed by the British-American Oil Producing Co., now has four producing horizons as a result of the completion of that company's 7-C Tribal, NE SW SW 32-4n-1w, as a 5,000,000 cu. ft. gas well in the Frontier sand at 3,260-94 ft. While drilling the deeper wells the presence of gas in the Frontier was disclosed, but this is the first well completed in that horizon.

Dry hole at Gooseberry.—The limits of the Gooseberry field, Park County, Wyoming, were defined on the west side in General Petroleum Corp. 1-29-P, SE SE 29-47n-100w, which was dry and abandoned at 6,095 ft. after testing the Tensleep.

Third Ellis sand well at Cat Creek.—Two offsets to Dave Schrock's discovery well in the Ellis in the Cat Creek field in Montana came in as producers, but not as large as the 300-bbl. first well. The second well, an east offset, made 100 bbl. per day initial. The third well, a south offset, completed this week, made 80 bbl. per day natural.

Second test at River Dome.—Pure Oil Co. is rigging up for its 1 Unit, NE cor. Lot 1, Section 12-48n-92½w on the River Dome structure in Washakie County, Wyoming. It is just to the north and a little west of 1 Unit, the deep test, which is bottomed at 8,136 ft. and testing the Muddy sand. It had good shows for a discovery in the Frontier sands.

New operations.—Twenty-two new operations were reported, 1 in Colorado, 5 in Wyoming, and 16 in Montana. Five are wildcats and 17 development wells. Three development wells in Wyoming are in Middle Baxter Basin, Dry Piney, and River Dome. Eleven are in the Kevin-Sunburst area and 4 in the Cut Bank field in Montana.

The most important of the wildcats is Continental Oil Co. 1 Reno, SW SE SW 1-30n-70w, a Madison test on the Indian Creek structure, 18 miles southeast of Douglas. Other Wyoming wildcat is Joe Minton 1 Government, SW SW NE 20-26n-113w, South La Barge, Lincoln County. Montana wildcats are George Harris 1 Winterrowed, SE SE SE 6-35n-21e, Blaine County, Cherry Ridge district, and R. C. Tarrant 1 Williams, C NE SW 29-9n-13e, Haymaker dome, Wheatland County.

Completions.—Twenty wells were completed, 14 oil wells, 3 gas wells, and 3 dry holes. These were distributed: 1 oil well in Colorado; 5 oil wells, 2 gas wells, and 2 dry holes in Wyoming, and 8 oil wells, 1 gas well and 1 dry hole in Montana.

WYOMING WILDCAT FAILURE

North Spring Creek, Park County: Pacific Western Oil Corp.-Mule Creek Oil Co. 2 Coe, NW NW SW 26-50n-102w, TD 4,968 ft., dry and abd. after testing Embar and Tensleep.

CANADIAN FIELDS

Central Alberta Test Deepening in Lime

CHATHAM.—In the central Alberta foothills northwest of Calgary, Home-Brazeau Syndicate 1, LSD 5, 17-43-17w5, encountered the Madison limestone contact at 9,498 ft., approximately 100 ft. higher than anticipated. The test is deepening with 7-in. casing set at 9,523 ft. The well is a joint test by Home Oil, Shell Oil, Socony-Vacuum, Imperial, California Standard and Anglo-Canadian Oils, of an extensive foothills structure 40 miles long and five miles wide in which geological conditions render possible a second Turner Valley, though deeper drilling is indicated. If the lime corresponds, production should be encountered between 9,700 and 9,900 ft.

Turner Valley.—In North Turner Valley, Royalite-Lowery 3, LSD 4, 11-20-3w5, with Madison lime at 8,308-8,850 ft. has initial production of 342 bbl.

Ram River.—In the Ram River-Clearwater area in the central Alberta foothills,

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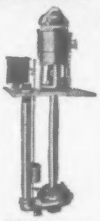

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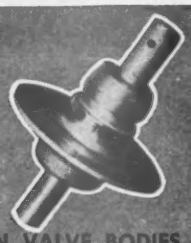

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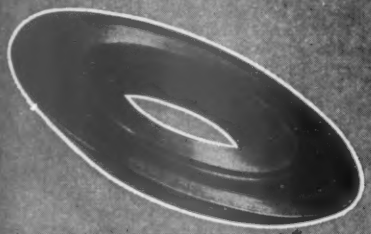

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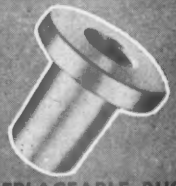

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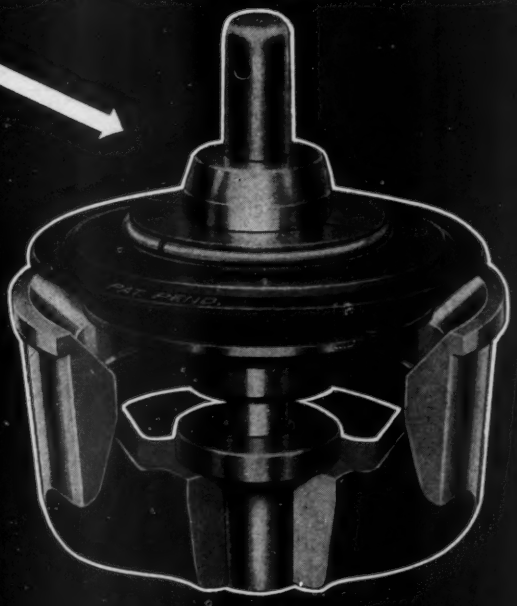

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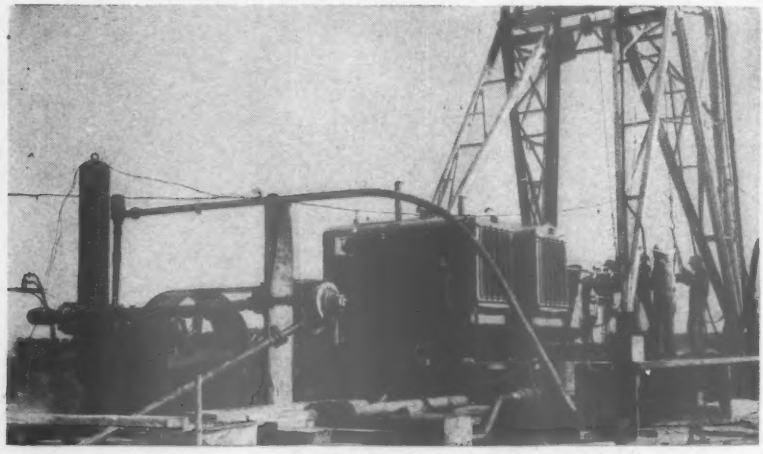
Ram River Oils 3, LSD 12, 1-37-11w5, bottoming in Devonian limestone at 5,745 ft. is acidizing and testing.

Stony Plains.—A new marginal area east of the central Alberta foothills is to be explored by Anglo-Canadian Oil Co. of Calgary which has taken up a reservation on 151,910 acres in the area west of Stony Plains, between Wabamun Lake on the north and the Saskatchewan River on the south. The area is previously untested.

Kinsella. — Systematic development of the Kinsella area east of Edmonton is being undertaken by Imperial Oil which recently secured a reservation of nearly 300,000 acres. Imperial-Kinsella 1, LSD 11, 20-47-9w4, is drilling and two additional locations have been made. Drilling in outlying areas of the Kinsella field is being undertaken following the reported discovery of oil shows in gas wells drilled by Northwestern Utilities of Edmonton.

Lloydminster.—In the Lloydminster field, eastern Alberta, Ponalta Oils 1, LSD 8, 12-45-1w4, has been placed on the pump at 1,882 ft. and is making around 20 bbl. with bailer in the hole. El Lee 1, LSD 1, 13-49-1w4, is testing at 1,903 ft. with indications of a fair producer. El Lee 2, LSD 2, 13-49-1w4, is abandoning at 1,923 ft. Two other tests are starting. In the Saskatchewan section of the field, Community Services 3, LSD 1, 10-49-28w3, at 1,886 ft., Community 6, LSD 8, 10-49-28w3 at 1,883 ft., and Groat 1, LSD 5, 1-49-28w3, at 1,865 ft., are finishing as oil producers.

Hay Lake Dome.—In the Hay Lake Dome area of southern Alberta, close to the Montana boundary, Admiral-British Dominion 2, LSD 10, 22-1-17w4, got the Madison lime contact at 3,075 ft. and has set casing at 3,068 ft. to acidize. A drill-stem test of porosity and oil saturation at the contact showed a 35-ft. rise of mud with no water. Admiral-British Dominion 1, LSD 7, 22-1-17w4, has light oil with some water from the top of the lime at 3,094 ft.



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SOUTHWEST TEXAS

Calhoun County Gets New Oil Pool

CORPUS CHRISTI.—A new oil pool in Calhoun County has been opened by Quintana Petroleum Corp. 1 W. A. Shofner Estate, in the Bonificio Rodriques League, 5 miles northwest of Port Lavaca. Drilled to a total depth of 8,613 ft., the well is producing through 117 perforations at 5,710-25 ft., flowing 74 bbl. per day of 37° gravity oil, no water, through a ⅛-in. choke. The gas-oil ratio is 835 to 1, tubing pressure 590 lb., and casing pressure 730 lb. The 5½-in. casing was set at 5,821 ft.

A new producing sand in the La Gloria field was opened by Magnolia Petroleum Co. 1 Church of the Brethern Unit, in Falfurrias Farm and Garden Tracts, Lot 2, Block 11, in Brooks County. Top of sand is 7,150 ft., total depth 10,000 ft., with production coming from 24 perforations at 7,150-55 ft. On potential test the well flowed 156 bbl. per day through a ⅛-in. choke, gas-oil ratio 805 to 1., tubing pressure 650 lb., no water.

Humble Oil & Refining Co. opened a new gas pool at their 1 H. S. Davis, T&NO Survey 15, Lot 6, Block 1, Carrizo Park Subdivision, 3½ miles southwest of Carrizo Springs, in Dimmit County. On potential test it flowed 5,750,000 cu. ft. of gas daily, and some salt water, through perforations at 2,710-17 ft., pressure 1,030 lb. Total depth is 7,550 ft.

George H. Echols 1 T. Dominguez, opener of the Echols field, Zapata County, Porcion 31, 9 miles northeast of Zapata, flowed gas through perforations at 1,948-68 ft., and has been shut in. Total depth is 2,242 ft.

In Victoria County, 5 miles east of Victoria, Taylor Refining Co. 1 Raymond F. Meyer, Andrew Peets Survey, Abstract 275, flowed gas through perforations at 4,720-26 ft., and was shut in without final gage. Total depth is 5,705 ft.

A new oil field is indicated for Kleberg County at Humble Oil & Refining Co. 1 King Ranch-Monte Negra, in Santa Gertrudis grant, 4 miles southwest of Kingsville. Drilled to a total depth of 7,067 ft. operators are drill-stem testing with a recovery on first test of 830 ft. of clean oil from 7,056-64 ft., and 1,640 ft. of clean oil and 30 ft. of oil-cut mud from 7,062-72 ft. on second test.

Seventeen new locations for this week included 5 wildcats, 2 in Duval and 1 each in Karnes, Refugio and Starr counties. Of the 33 completions 13 were wildcats, 5 successful and 8 dry holes. New pools were opened in Calhoun, Dimmit, Victoria, and Zapata counties, with 1 new pay in Brooks County.

SUCCESSFUL WILDCATS COMPLETED IN SOUTHWEST TEXAS

Brooks County: New oil sand La Gloria field — Magnolia 1 Church of the Brethren Unit, Falfurrias Farm and Garden Tracts, Lot 2, Block 11, top of sand 7,150 ft., TD 10,000 ft., perf. with 24 holes, 7,150-55 ft., PT 156 bbl. per day through a ⅛-in. choke, gas-oil ratio 805 to 1, tubing pressure 650 lb., no water.

Calhoun County: New oil pool—Quintana Petroleum 1 W. A. Shofner Estate, Bonifacio Rodriques League, 5 miles northwest of Port Lavaca, top sand 5,710 ft., with 117 perforations 5,710-25 ft., TD 8,613 ft., PBTD 5,869 ft., PT 74 bbl. per day 37° through a ⅛-in. choke, gas-oil ratio 835 to 1, tubing pressure 590 lb., casing pressure 730 lb., no water.

Dimmit County: New gas pool—Humble 1 H. S. Davis, T&NO Survey 15, Lot

6, Block 1, Subdivision "A" of Carrizo Park Subdivision, 3½ miles southwest of Carrizo Springs, TD 7,550 ft., perf. 42 holes 2,710-17 ft., PT 5,750,000 cu. ft. gas daily, 1,030 lb., some salt water.

Victoria County: New gas pool—Taylor Refining Co. 1 Raymond F. Meyer, Andrew Peets Survey, Abstract 275, 5 miles south of Victoria, TD 5,705 ft., perf. 22 holes 4,720-26 ft., PT gas well, no gage, shut in, tubing pressure 1,750 lb.

Zapata County: New gas pool, Echols field—Geo. H. Echols 1 T. Dominguez, Porcion 31, Share "A," 9 miles northeast of Zapata, TD 2,242 ft., perforations 1,948-68 ft., PT gas well, shut in.

WILDCAT FAILURES COMPLETED IN SOUTHWEST TEXAS

Bee County: Smith, Story & Wood Corp. 1 National Bank of Commerce, Wangemann Ranch, Subdivision 36, 7 miles northeast of Beeville, dry at 5,516 ft. G. W. Strake et al 1 Mrs. N. L. McKinney et al, L. C. Randolph Survey, Abstract 279, 2 miles southeast of Pettus, dry at 8,310 ft.

Duval County: Raymond D. Reynolds 1 Flory D. Lowe, J. G. Lowe Survey, Section 74, 21 miles northwest of San Diego, dry at 3,406 ft.

Kleberg County: Humble 1-D D. J. Sullivan, A&NW Survey 19, 5 miles west of Sarita, dry at 9,242 ft.

Milam County: Glenn & Harding 2 J. S. Jacobs, Jose Leal Survey, 3 miles southeast of Minerva townsite, dry at 1,130 ft.

Starr County: W. L. Goldston 2 Roos & Bennett, Porcion 93, Share 100, 10 miles northeast of Rio Grande City, dry at 4,726 ft.

San Patricio County: Coastal Refining Co. and Henshaw Brothers 1 Luling Foundation, Cubage & Miller Subdivision of O'Connor Pasture, Section 50, 4 miles northeast of Edroy, dry at 6,326 ft.

Webb County: O. W. Killam 2 L. R. Ortiz, Porcion 26, Survey 2026, 13 miles northeast of Laredo, dry at 5,155 ft.

MISSISSIPPI

Six Tests Drilling In Cranfield Field

JACKSON.—Five Tuscaloosa Massive sand tests, and one Wilcox test are in progress in the Cranfield field of Adams and Franklin counties, making this the most active area in the state. Gulf Refining Co. 2 Lees, 69-7n-1w, is at a depth of 10,398 ft., and is preparing to take a drillstem test of the Massive sand. T. F. Hodge et al 1 Malone, 73-7n-1w, and California Co. 1 Armstrong, 27-7n-1w, are locations. California 1 Johnson, 27-7n-1w, is waiting on cement after setting casing at 1,807 ft. California 8 Lees, 29-7n-1w, is fishing, and is at total depth of 10,305 ft. California 4 Ratcliffe Lease No. 1, 46-7n-1w, is waiting on cement after setting casing at 5,886 ft.

Just completed is a Cranfield well, California 10 Lees, 29-7n-1w, which flowed 289 bbl. of 37.7-gravity oil in 24 hours through 9/64-in. choke.

Nine field locations have been announced, and two wildcat starts are scheduled. Wildcats will be scheduled one each for Adams and Wilkinson counties.

MISSISSIPPI WILDCAT FAILURES

Itawamba County: Gregtex Gasoline 1 Burdine, NW NE SE 16-11s-9e, dry, TD 1,511 ft., Gasper 1,008 ft.

Jasper County: A. S. Myers et al 1 King, SW SE 30-1n-12e, dry, TD 6,275 ft., Chimney Hill 4,280 ft., junked when unable to recover fish.

Madison County: Sohio 1 Andrews, 760 ft. north and 708 ft. west of SE corner of NE SW 11-9n-1w, dry, TD 7,561 ft., Comanche 7,542 ft.

Yazoo County: Carter 1 Ingram, 585 ft. north and 510 ft. west of SE corner of 2-12n-2w, dry, TD 6,358 ft., Eutaw 5,812 ft.

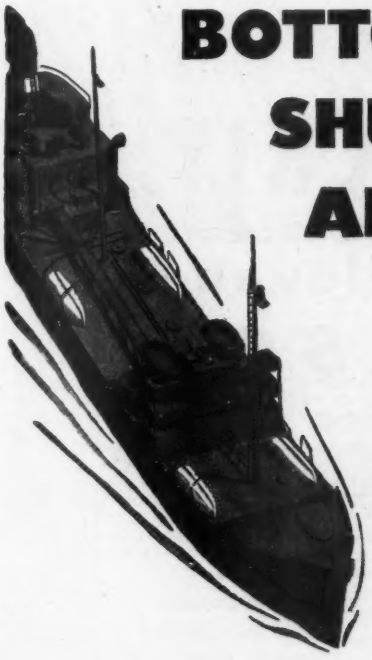
ILLINOIS

Mattoon Field Extended Two Miles Southward

MATTOON.—V. M. Schaef 1 B. F. Bresee, NE NE SE 15-11n-7e, Coles County wildcat, opened a new productive area when it was completed on pump for 108 bbl. of oil and 7 bbl. of water daily. Production was obtained after a 140-qt. shot in the Aux Vases sand at 1,965-2,032 ft. Total depth of the well is 2,032 ft. The 1 Bresee is approximately 2 miles south of other production in the Mattoon field and may prove an extension to that field. However, several dry holes have been drilled in the area between the 1 Bresee and the main producing area of the field.

The Mattoon field, meanwhile, remained the most active single area in Illinois, with about 30 rigs running. Wells in the field are completed in the Cypress sand at about 1,800 ft. and the Aux Vases sand (Rosiclare) at about 1,950 ft. Although the Mattoon field proper was discovered several years ago, the new trends and extensions are recent finds and are responsible for the present activity in that area. The drilling around Mattoon has revived interest in several of the older counties and is also bringing many of the major oil companies back to acreage they had given up with the belief that it was unproductive.

In the Bible Grove East field, Kingwood



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Oil Co. 2 Fulk, NW SW SW 13-5n-7e, is showing for the best well in its area to date. The 2 Fulk is now on a production test of the McClosky lime at 2,826-28 ft., 2,833-43 ft. and 2,865-69 ft., from which, after a treatment of 5,000 gal. of acid, it flowed 700 bbl. of oil in the first 12 hours and 1,100 bbl. of oil in the first 24 hours.

ILLINOIS SUCCESSFUL WILDCAT

Coles County: V. M. Schaef 1 B. F. Bresee, NE NE SE 15-11n-7e, pumped 108 bbl. oil and 7 bbl. water, 140-qt. shot 1,965-2,032 ft., Aux Vases sand 1,964-74 ft., TD 2,032 ft.

ILLINOIS WILDCAT FAILURES

Coles County: C.P.L. 1 H. J. & Jessie Groniger, SW SW SW 7-12n-8e, dry at 2,118 ft., Glen Dean 1,731 ft., Cypress sand 1,837-53 ft., Paint Creek sand 1,973-78 ft., Ste. Genevieve 2,016 ft., Rosiclare 2,030 ft., McClosky 2,078-86 ft.

Tom L. Smith 1 Andres, NE SE NW 22-11n-7e, dry at 2,165 ft., Glen Dean 1,728 ft., Cypress sand 1,896-1,908 ft., Aux Vases sand 2,006-30 ft., Ste. Genevieve 2,074 ft., Rosiclare 2,090-98 ft.

Fayette County: Texas 1 G. Soldner, NE SE SE 36-5n-4e, dry at 2,745 ft., Tar Springs 2,037 ft., Cypress sand 2,264 ft., Benoist sand 2,449 ft., Aux Vases sand 2,495 ft., Ste. Genevieve 2,579 ft., McClosky 2,617 ft.

Madison County: Sohio 1 J. Conrad, NE NE NW 29-5n-6w, dry at 1,824 ft., Devonian 1,740 ft., Silurian 1,771 ft.

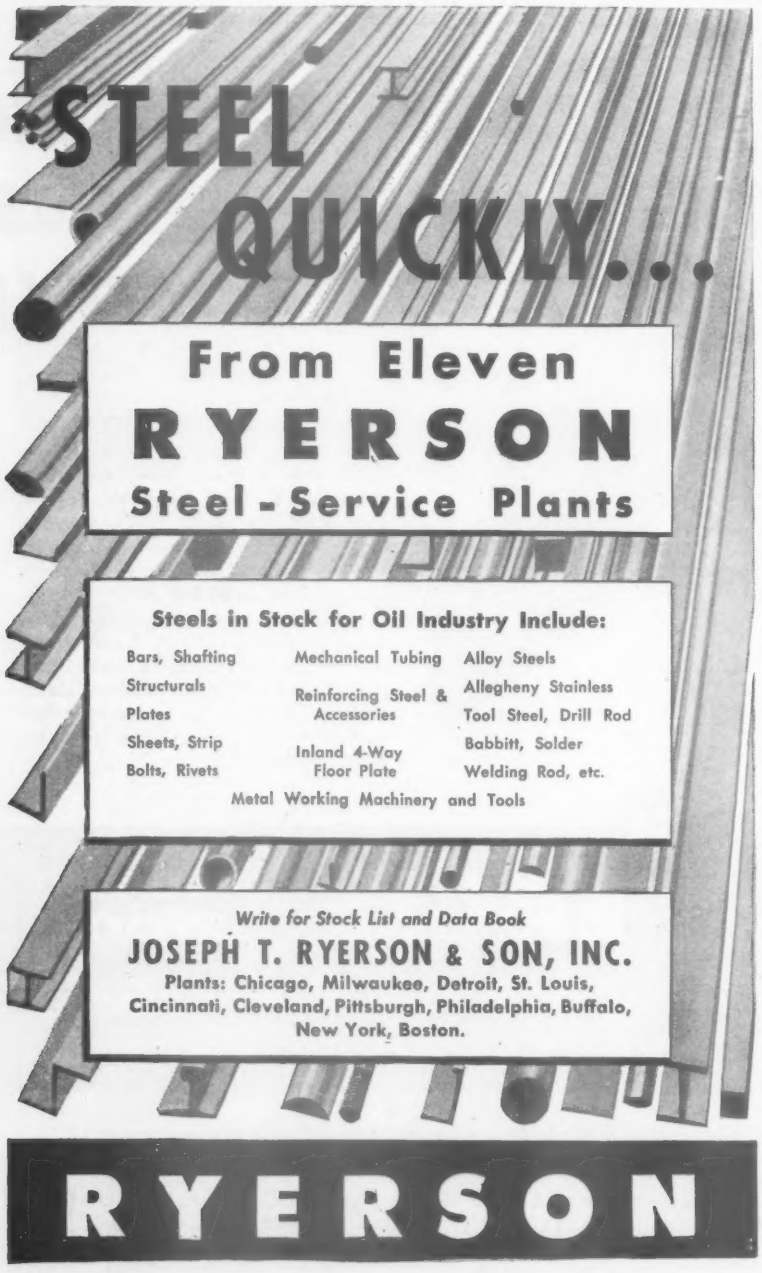
Marion County: Superior 1 L. McNeilly et al, NW NW SE 31-1n-2e, dry at 2,455 ft., Tar Springs sand 1,705 ft., Cypress sand 2,005 ft., Benoist sand 2,150 ft., Aux Vases sand 2,209 ft., Ste. Genevieve 2,308 ft., Fredonia 2,355 ft.

St. Clair County: St. Clair Oil Dev. Co. 1 Schwaegee, SE NE NE 36-2n-8w, dry at 1,975 ft.

Wayne County: A. J. Slagter 1 R. Hubble, SW SW SW 31-2n-9e, dry at 3,109 ft., McClosky 3,096-3,100 ft.

White County: Pittsburgh & Fairmont Coal 1 M. Land, NW NW SE 25-5s-9e, dry at 3,200 ft., Benoist sand 2,893 ft.

Union County: A. S. Mimms 1 R. B. Popshnick, NW NW NW 26-13s-3w, dry at 1,525 ft., Trenton 122 ft.



OHIO, KENTUCKY

Two-Pay Gas Well Found In Tuscarawas County

COLUMBUS. — Status Development Co. 1 George Szabados, Lot 34, Sandy Township, Tuscarawas County, gaged 1,200,000 cu. ft. from two pays in the Clinton at 4,750-4,820 ft., and shut in after shot at 1,532,000 cu. ft. The completion will encourage further drilling in the undeveloped north-central part of the township.

Benedum-Trees 1 Frank McGurrer, Lot 20, Mayfield Township, Cuyahoga County, gaged 555,000 cu. ft. and a show of oil in the Newburg at 2,836-2,915 ft. After shot, the well was shut in at 1,000,000 cu. ft. with 800 lb. pressure indicating a considerable remaining reserve along the south part of the pool.

The new gas pool south of Lakeville in Washington Township, Holmes County, was extended a location south by Ohio Fuel Gas Co. 1 Ada Nouse, Sec. 1. Clinton sand, found at 3,140-63 ft., gaged 1,560,000 cu. ft. natural.

The Ashland-Lorain field led in new locations reported with 8 of 21, and also in completions with 7 of 25.

OHIO WILDCAT FAILURES

Columbiana County, Knox Township: Ohio Oil 1 Samuel Sturgeon, Sec. 23, Clinton 5,337-5,449 ft., TD 5,543 ft., dry.

Licking County, Fallsbury Township: Industrial Gas 1 William Painter, Sec. 25, Clinton 2,743-68 ft., TD 2,803 ft., dry.

WESTERN KENTUCKY

OWENSBORO.—The Basin Drilling Co. 1 Kasey Club, 8-P-23, which last week recovered 1,025 ft. gas, 240 ft. muddy oil and 300 ft. of gas-cut mud with no water on a 15-minute drill-stem test of the McClosky lime at 2,440-48 ft., is starting to drill plug to make a production test of the McClosky saturation. The total depth of the well is 2,461 ft. The 1 Kasey Club, a Henderson County wildcat, is about 5 miles from other oil production.

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: Sun Oil Co. 1 E. M. Crafton et al, 12-Q-20, dry at 2,720 ft., Menard 1,777 ft., Glen Dean 2,063 ft., Cypress sand 2,311-21 ft., Ste. Genevieve 2,606 ft., McClosky 2,662-66 ft., 2,671-75 ft.

W. F. Bilsky 1 C. A. Moore, 22-P-24, dry at 2,564 ft., Glen Dean 1,805 ft., St. Genevieve 2,361 ft., St. Louis 2,548 ft.

EASTERN KENTUCKY

ASHLAND.—Three oil wells, a dry hole and one gas well were completed in the eastern Kentucky fields last week. Kentucky-West Virginia Gas Co. No. 797 on the W. F. Lowe property in Pike County, total depth 3,335 ft., had a daily open flow of 119,000 cu. ft. of gas in shale, after shot. Coleman Hunter No. 2 J. W. Gillum heirs' property in Elliott County, Rocky Branch, total depth 809 ft., was good for 5 bbl. Patterson, Dyer & Rader No. 3 on the Charles and Rachael Mentor property, Jackson County, 1,075 ft., also made 5 bbl. Ashland Oil & Refining Co.

No. 7-A on the Wooley heirs property in Bath County, total depth 833 ft., was dry.

INDIANA

EVANSVILLE.—In the area 2½ miles southeast of Mt. Carmel, Ryan Oil Co. 1 N. H. Kern, SE SW SW 23-1s-12w, Gibson County wildcat, is showing prospects of either extending the Mt. Carmel field or opening a new oil producing area. The 1 Kern is cleaning out and testing after a 61-qt. shot in the Cypress sand at 1,965-80 ft. Total depth is 1,980 ft. At latest reports, No. 1 Kern was swabbing about 8 bbl. of oil per hour.

KANSAS

Dodge Production Found In New Vohs Field

THE new Vohs field of Rooks County, discovered in July of this year, has been given a new producing horizon by the Stanolind Oil & Gas Co. 2 Senecal, SW SW SW 12-10-19w, an edge well in the pool. Following acid treatment, operators swabbed at the rate of 42 bbl. per hour from the Dodge formation at 3,357-66 ft. Other wells in the pool produce from the Arbuckle.

Ohio Oil Co. 1 Bohls, SE SE NW 2-19-15w, Barton County, gave the Kruckenberg pool an important extension to the north. The well is producing from the Arbuckle at 3,582-3,650 ft., and carries a minimum potential of 25 bbl. per day. In preliminary tests, operators swabbed 15 bbl. per hour.

Globe Oil Co. 1 Kruger, SE SE SW 23-20-12w, a wildcat just west of the West Marchard-Silica pool of Barton County, is testing the Arbuckle, cut at 3,361 ft. A drill-stem test at 3,363-87 ft. recovered 30 ft. of oil and 120 ft. of oil-cut mud. Operators have swabbed 6 bbl. of oil per hour. Testing will continue.

Kansas completions numbered 38, including 13 oilers, 7 gas wells, and 18 dry holes. One gas wildcat was completed and 11 dry holes were wildcat failures. Trapp, Virgil, Stoltenberg, and Northwest Skinner pools had two completions each. Forty-four new starts have been announced, including six wildcat locations, spotted in Barber, Graham, Gray, Miami, Rooks, and Stafford counties.

KANSAS SUCCESSFUL WILDCAT

Pawnee County: New gas field—Huber and Kiowa 1 Katchelman, NE NE NE 34-22-16w, flowed 36,500,000 cu. ft. gas from Simpson dolomite at 4,060-4,107 ft., TD 4,107 ft., Simpson 4,047 ft., Simpson dolomite 4,509 ft., Arbuckle 4,078 ft.

KANSAS WILDCAT FAILURES

Barton County: Republic Natural 1 Harmison, NE NE NE 5-19-13w, dry, TD 3,451 ft., Arbuckle 3,399 ft.

Butler County: G. L. Ramsey 1 Ramsey, NE NW SW 22-24-5e, dry, TD 2,810 ft., Kansas City 2,175 ft.

Cowley County: Tom Palmer 1 Kittleson, NW SW SW 12-32-3e, dry, TD 3,435 ft., Arbuckle 3,414 ft.

Dickinson County: P. M. Polhamus 1 Lefert, NE NE SW 1-11-3e, dry, TD 2,980 ft., Arbuckle 2,932 ft.

Douglas County: Volcanic Oil 1 Gorrill, SE SE NE 26-12-18e, dry, TD 2,146 ft., Wilcox 2,130 ft.

Ellis County: Phil Han 1 Raynesford, SW SW SW 17-13-20w, dry, TD 3,930 ft., Arbuckle 3,897 ft.

Eldorado and B & R Drilling 1 Rankin, NE NE NE 33-13-20w, dry, TD 3,950 ft., Arbuckle 3,918 ft.

Harvey County: Harbar and Palmer 1 Strausz, SW SW NE 6-22-2w, dry, TD 3,802 ft., Arbuckle 3,777 ft.

Miami County: Brundrid Oil 1 Tar Supply Co., SE SE NE 36-16-21e, dry, TD 1,700 ft., Arbuckle 1,547 ft.

Rooks County: Skelly 1 Sutor, NE NE SW 24-10-20w, dry, TD 3,799 ft., Arbuckle 3,769 ft.

Stafford County: Sohio 1 Richardson, NE NE SE 19-24-11w, dry, TD 4,095 ft., Arbuckle 4,059 ft.

NEBRASKA WILDCAT FAILURE

Richardson County: R. S. Tomer Production 1 Miles, NE NE NE 35-1n-15e, dry, TD 2,750 ft., Hunton 2,644 ft.

MISSOURI WILDCAT FAILURES

Atchison County: Dan Short 1 Tarkio College, SE SW NE 15-65n-41w, dry, TD 1,410 ft., Kansas City 637 ft.

Platte County: Fox 1 fee, SE SE SW 12-51n-35w, dry, TD 690 ft., base Marmaton 640 ft.

Putnam County: Dan McLaughlin et al 1 Johnson, SE SW 14-65n-21w, dry, TD 1,690 ft., Decorah 1,655 ft.

OKLAHOMA

Mechanical Trouble Delays Noble County Prospect

TESTING of the Wilcox sand at Noble County's newest prospective pool opener, Deep Rock Oil Corp. 1 White, SW NE NE 19-23n-2w, was delayed by mechanical trouble during the latter part of the week after packer had been set above the sand at 4,427 ft. The wildcat originally showed for 12,000,000 cu. ft. gas on a 12-minute drill-stem test taken at 4,415-27 ft. Following the testing, the well was deepened to 4,429 ft. and two cores were taken from 4,429-34 ft. and 4,434-39½ ft. The first coring operation recovered 4 ft. of coarse, brown dolomite with good stain and odor, while results of the second operation were not learned.

Sohio Petroleum Co. appears to have good prospects for a Simpson sand discovery at its 1 Tolbert, Garvin County wildcat in NE NW NE 9-3n-1w. On a drill-stem test taken at 4,492-4,547 ft., the well showed air in 1 minute and gas in 2 minutes. The gas was estimated at 5,000,000 cu. ft. Recovery was 10 ft. of oil-cut mud with a little free oil and no water. Operators then cored from 4,547-54 ft. and recovered saturated, porous sand with good oil stain and odor. A drill-stem test taken 4,550-54 ft. with ½-in. bottom-hole choke and 150 lb. back pressure on a 2-in. flow line showed 8,000,000 to 10,000,000 cu. ft. of dry gas. The 1 Tolbert is 3 miles southwest of production in the Pauls Valley field.

At latest reports, Pure Oil Co. was drilling ahead below 5,772 ft. at its closely watched McClain County wildcat, 1-A McCrummen, NE NE NE 33-5n-1w. A core taken at 5,590-5,648 ft. recovered hard lime with stains, but a 30-minute drill-stem test taken from 5,591-5,648 ft. divulged no oil shows.

OKLAHOMA SUCCESSFUL WILDCATS

Muskogee County: New gas field—P. Adkins 1 Ford, NW SE NW 1-13n-18e, 400,000 cu. ft. gas from Muskogee sand 1,100-30 ft., TD 1,130 ft., Muskogee sand 1,100 ft.

Stephens County: New gas field—T. H. McCasland 1 Russell, NE NW SE 30-1n-5w, 23,500,000 cu. ft. gas from sand at 1,666-72 ft., TD 2,535 ft., PB 1,688 ft.

OKLAHOMA WILDCAT FAILURES

Grady County: Phillips et al 1 Duke, SW SW SE 28-5n-8w, dry, TD 10,708 ft., Wade sand 5,670 ft.

Lincoln County: Jackson 1 Gage, SW SE SE 30-14n-5e, dry, TD 4,882 ft., second Wilcox 4,865 ft.

Noble County: Ohio 1 Hubbart, NW SW SE 18-20n-1w, dry, TD 5,239 ft., second Wilcox 5,232 ft.

Pottawatomie County: L. B. Jackson and Deep Rock 1 Rose, NW SE NE 26-11n-2e, dry, TD 5,910 ft., second Wilcox 5,901 ft.

Seminole County: Mealy-Wolfe and Vickers 1 Madale, NW SE NW 26-9n-5e, dry, TD 4,309 ft., Wilcox 4,300 ft.

Stephens County: Skelly 2 Henry, NE NE SE 12-2s-5w, dry, TD 1,353 ft.

LA.-ARK.

Bienville Parish Well Has Gas in Travis Peak

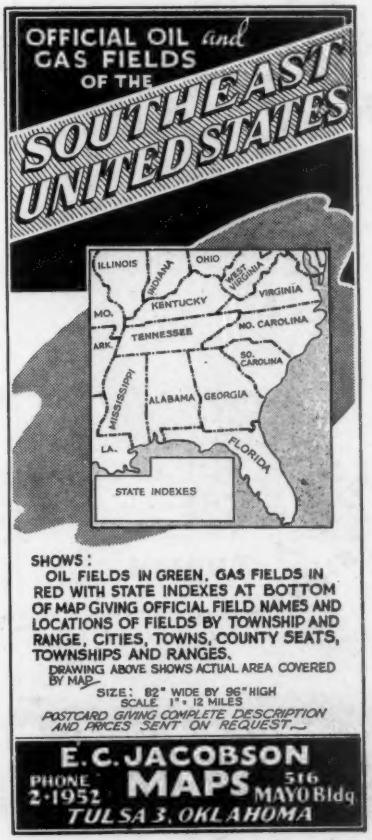
SHREVEPORT.—Ohio Oil Co. 1 Crow, NE 32-17n-7w, is preparing to complete in the Travis Peak for 20,000,000 cu. ft. of gas on open flow. Perforations were made and squeezed in the Pettit at 6,778-6,880 ft., and the well will be completed from a zone at 7,535-48 ft. in the Travis Peak.

In La Salle Parish, Carter Oil Co. 3 Tensas Delta-D, NW NW 36-6n-3e, flowed 11 bbl. of fluid per hour after perforating at 4,294-98 ft. The well was drilled to 4,500 ft., and operators will reperforate.

North Louisiana completions numbered 20 this week, including 12 oil wells, 2 gas wells, and 6 dry holes, one of which was a wildcat try. Delhi pool of Richland Parish led with six completions, and Big Creek field had four finals.

NORTH LOUISIANA WILDCAT FAILURE

Madison Parish: C. H. Murphy, Jr. and Sun Oil 1 Lee, 990 ft. north and 430 ft. east of SW corner of 8-17n-12e, dry, TD 4,603 ft.



SHOWS:
OIL FIELDS IN GREEN, GAS FIELDS IN RED WITH STATE INDEXES AT BOTTOM OF MAP GIVING OFFICIAL FIELD NAMES AND LOCATIONS OF FIELDS BY TOWNSHIP AND RANGE, CITIES, TOWNS, COUNTY SEATS, TOWNSHIPS AND RANGES.

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W. T. "Walt" Caldwell and **A. W. "Al" Braithwaite,** long-time employes of George E. Failing Supply

W. T. CALDWELL

A. BRAITHWAITE

Co., of Enid, Okla., and Houston, Tex., have announced their resignations to form a partnership as core drilling contractors and have purchased two Failing 1500 drills. Caldwell, who was plant manager at Enid, has been in the service of the Failing company for 21 years. Braithwaite was with the company 13 years as field engineer. Offices of the new company will be in Enid.

Fred Manning, Inc., has the contract for Continental Oil Co. wildcat, 1 Reno, a Madison test on the Indian Creek structure, 18 miles southeast of Douglas, Wyo.

Jack H. Abernathy has accepted a position as vice president of Big Chief Drilling Co., with headquarters at Oklahoma City, it is announced by William T. Payne, president. Abernathy was formerly assistant general superintendent of production for Sunray Oil Corp. at Tulsa.

Danciger Oil Co. is the contractor for Gulf Refining Co. 1 Walker, 670 ft. south and 630 ft. east of NW corner of NE SW 34-9n-19w, in the Gwinville field, Jeff Davis County, Mississippi.

Keys Drilling Co. will drill the W. L. Hartman 1 Anschutz, SE SE NW 11-21-14w, a wildcat in Stafford County, Kansas.

Merrill Drilling Co. has the contract for four new tests in the Deep River pool of Arenac County, Michigan. They are J. E. Bauer 4 Lovell Post, NE SW SE 15-19n-4e, J. E. Bauer 6 Lovell Post, NE NW SE 15-19n-4e, J. E. Bauer 3 Kroczaleski, SE SW NE 23-19n-4e, and J. E. Bauer 4 Kroczaleski, SW SW NE 23-19n-4e.

Wheless Drilling Co. is building derrick for California Co. 1 Homochitto Lumber Co.—Lease No. 3, 27-7n-1e, in the Cranfield field, Franklin County, Mississippi.

Texana Drilling Co., Dallas, has contract for George McCamey 1 J. L. Raborn, Limestone County wildcat, 330 ft. south and west of north corner of 54.4-acre tract, J. N. Acosta Survey.

Dixie Drilling Co. will drill the California Co. 9 Lees, in Section 45-7n-1w, in the Cranfield field of Adams County, Mississippi.

Camay Drilling Co. has started a new contract job for Amerada Pe-

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troleum Corp. in the Thornton gas field district of Sacramento County in Section 28-5n-5e.

Wofford, Nicholson & Rose, Inc., will drill Chalmette Petroleum Co. 1 Thompson, NW SE NE 26-18n-5e, northeast of Cushing pool in Payne County, Oklahoma.

Robert W. Atha has the contract for Gulf Refining Co. 2 Kawkawlin Townsite, SW NE NW 1-14n-4e, in the Kawkawlin pool of Bay County, Michigan.

CALENDAR

December

New Mexico Oil and Gas Association, annual meeting, Artesia, N. M., December 5.

Rocky Mountain Oil and Gas Association, annual meeting, Townsend Hotel, Casper, Wyo., December 7-8.

Independent Natural Gas Association of America, annual membership meeting. Baker Hotel, Dallas, December 10.

Michigan Oil and Gas Association, annual meeting, Mt. Pleasant, December 3.

Interstate Oil Compact Commission, Wichita, Kans., December 13-15.

1946

January

FPC regional hearing in natural-gas investigation, Houston, January 28.

Independent Natural Gas Association of America, annual membership meeting, Texas State Hotel, Houston, January 28.

February

American Welding Society, national meeting, Hotel Cleveland, Cleveland, February 4-7.

Iron and Steel and Institute of Metals divisions, American Institute of Mining and Metallurgical Engineers, national meeting, Statler Hotel, Cleveland, February 4-8.

American Society for Metals, annual convention (postponed from 1945), Statler Hotel, Cleveland, February 4-8.

FPC regional hearing in natural-gas investigation, Biloxi, Miss., February 11.

FPC regional hearing in natural-gas investigation, Chicago, February 19.

American Society for Testing Materials, spring meeting, Pittsburgh, February 25-March 1.

Exposition of Chemical Industries, twentieth exposition, Grand Central Palace, New York, February 25-March 2.

March

FPC regional hearing in natural-gas investigation, Charleston, W. Va., March 19.

Southern Gas Association, annual convention, Galveston, March 21-22.

April

American Association of Petroleum Geologists, annual meeting, Stevens Hotel, Chicago, April 2-4.

Natural Gasoline Association of America, annual convention, Baker Hotel, Dallas, April 17-19.

National Petroleum Association, semi-annual meeting, Hotel Cleveland, Cleveland, Ohio, April 18-19.

May

National Association of Corrosion Engineers, annual meeting, President Hotel, Kansas City, Mo., May 7-9.

June

American Society for Testing Materials, annual meeting, Buffalo, June 24-28.

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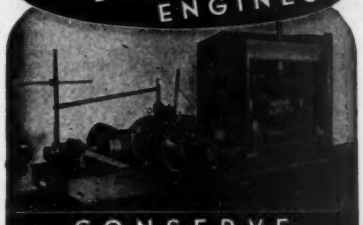

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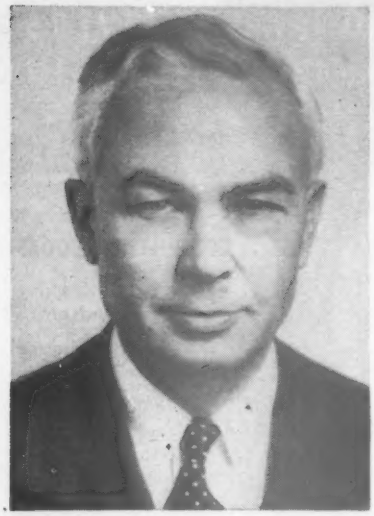


Payne Was Chemist Before He Got Into Drilling

WILLIAM T. PAYNE, recently elected president of American Association of Oilwell Drilling Contractors, was a chemist before he got into drilling. After graduating in 1915 from Oklahoma A. & M. College with a degree in chemistry and bacteriology he spent a year in graduate study at Massachusetts State College. Then came a year as a chemist in Detroit, after which he was commissioned a second lieutenant in the Army Sanitary Corps and served at New Haven, Conn., and Oswego, N. Y.

Moved by a desire to be closer to his old home in Tecumseh, Okla., young Payne got a job in 1919 as an oil scout for North American Oil & Refining Co. in the Cement field, Oklahoma. Two years later he entered into partnership with Walter Helmerich, and they did contract drilling in the Burbank, Tonkawa, and Braman fields of northern Oklahoma.

In 1936 Payne formed Big Chief Drilling Co. and sold his interest in Helmerich & Payne, Inc. From offices in Oklahoma City he directs operations of Big Chief. In Illinois he works with Harold Rowley as the Big Chief Drilling Co.-Rowley partnership. He recently organized Payne Petroleum Corp., a personal holding company. He is active in civic affairs and is chairman of the oil and gas division of Oklahoma City Chamber of Commerce.

Edward C. Borrego, formerly of Creole Petroleum Corp., is now located in Rome, Italy, as petroleum attache of the United States embassy. Borrego received his discharge from the U. S. Army earlier in the year. He served as a major in the Mediterranean area.

James A. Hall, released from the Army, has been made district petroleum engineer for the Texas Railroad Commission's oil and gas division in Midland. Following graduation from Texas A. & M. College in 1937, Hall was employed by the commission until he entered the Army in 1940 as a second lieutenant. He served in the Pacific theater and was promoted to captain. His assignment to the West Texas district conforms with the commission's recently adopted policy of employing graduate engineers to work with the oil operators on production and conservation problems.

Miller W. Conn, following 2½ years in the Naval Air Forces, has resumed his former position as manager of the Perco division, chemical products department, Phillips Petroleum Co., Bartlesville, Okla. Commissioned a lieutenant in the U. S. Naval Reserve, Conn saw service in four continental naval air stations and for 11 months was attached to the U. S. Atlantic Fleet, Trinidad, B.W.I. **A. E. Buell,** who was acting manager of the Perco division during Conn's absence, will again devote all of his attention to his position as manager of the special products division.

M. W. CONN

Thomas Buras, formerly purchasing agent for Northern Ordnance Co., Tulsa, and later with Bethlehem Supply Co. in Shreveport, is now purchasing agent for Kerlyn Oil Co. in Kansas City.

K. S. Adams, president of Phillips Petroleum Co., was honor guest at a dinner arranged by **Frank Phillips,** founder and chairman of the board, at Woolaroc, near Bartlesville, Okla., marking Adams' 25 years of service with Phillips. On April 1, 1938, when 38, Adams was elected to head the company, which he had joined 17 years before as a warehouse clerk. Adams, who played football and basketball at Kansas University, helped to organize the first Phillips basketball team, now famous as fourth-time winner of the National A. A. U. championship.

Dr. Bailey Willis, who at 88 is referred to as "grand old man of geology," spoke November 19 in Tulsa on "Terrestrial Dynamics." Dr. Willis is making a tour under the auspices of the distinguished lecture committee of American Association of Petroleum Geologists.

Maj. John E. Selden, Oil City, Pa., has been elected secretary and counsel of South Penn Oil Co., taking the place of **John L. Hays.** The latter, relieved at his own request of that office and the post of general counsel, will continue to serve as a director. Major Selden recently returned to South Penn after service in the Army Air Forces.

Dr. C. L. Burrill, since 1940 a specialist in petroleum economics for Standard Oil Co. (N. J.), has been made head of the budget department. He succeeds **Richardson Pratt,** who resigned to devote full time to private interests. Dr. Burrill, civil engineer and petroleum economist, joined the company from Harvard University School of Business Administration, where he was a faculty member.

Frank P. Donohue, new manager of the oil-loan department of National Bank of Commerce, Houston, has had wide experience in the oil business. After graduating from Harvard he spent 8 years in drilling, production, and engineering work in Pennsylvania, Oklahoma, Texas, and Mexico. In 1928 he went to Venezuela as chief production engineer for Lago Petroleum Corp. In 1930 he became chief engineer for Southern Crude Oil Purchasing Co. and Southern Pipe Line Co. in West Texas, taking over the presidency of the two companies the following year. In 1932 he established his own consulting office in New York. In 1936, he was engaged by Lehman Corp. to head its oil-in-

vestment department. In 1942 he joined Petroleum Administration for War, becoming chief of the foreign production section.

H. W. Sanders, who was treasurer of Union Oil Co. of California, has been elected secretary-treasurer, taking over the duties hitherto performed by **W. R. Edwards,** secretary, who retired.

Steve Wakner, former independent operator, has joined the land department of Kingwood Oil Co. in Evansville, Ind.

Paul Drickey, who had served in the Army Air Forces since 1942, has joined Stanolind Oil & Gas Co. as a scout in its Midland, Tex., office.

H. G. Harder, formerly district superintendent at Oklahoma City for Cities Service Oil Co., has joined Sunray Oil Co. as assistant production superintendent. He succeeds **Jack H. Abernathy,** who resigned to become vice president of Big Chief Drilling Co. **John Cleverly,** formerly superintendent at Russell, Kans., for Cities Service, takes Harder's place at Oklahoma City.

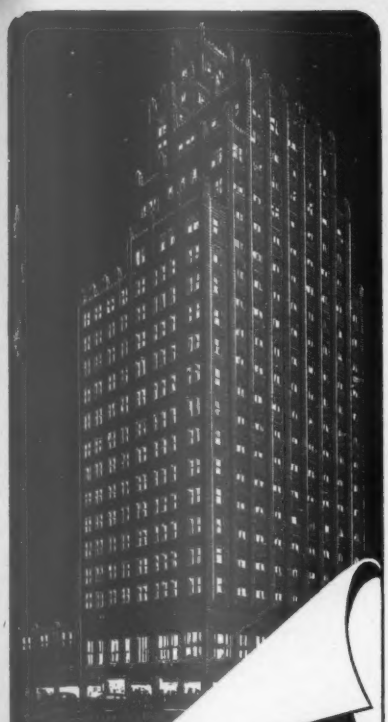
Rex L. Dawson, formerly division landman for The Carter Oil Co. at Mattoon, Ill., has been transferred to Billings, Mont., taking charge of Carter's land department in the northern division.

A. A. MacKrille, who was a commander in the Navy and was assistant manager of national sales for Shell Oil Co., Inc., until he enteréd war service in 1942, has been made national sales manager. He takes the place of **C. B. Singleton,** who retired after 32 years with the company. MacKrille is a Brown University graduate.

R. H. Maupin has been made general traffic manager of Pan American Petroleum & Transport Co. and affiliates, succeeding **John S. Wood,** who retired after more than 30 years' service.

C. H. Conway is in charge of a district office which Amerada Petroleum Corp. has opened in Shreveport for northern Louisiana and Arkansas. **Frank Gifford** is geological scout. **Lloyd Jeter,** released from the Army Air Forces, has joined Amerada's Midland, Tex., office as scout.

George S. Berry, who was a lieutenant colonel in the Army, has been appointed district landman for Sinclair Prairie Oil Co. in the North and West Central Texas districts, with headquarters in Wichita Falls. Before entering military service he was in the Fort Worth office.



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P. E. CONNER

S. A. BROOKS

G. W. STEVENS

A. B. EGAN

Equipment Men in News

J. C. Failing has assumed the duties of sales engineer for George E. Failing Supply Co., of Enid, Okla., and Houston, Tex., manufacturers of portable exploration and drilling equipment. The Failing company is making plans to open two branch stores to serve the oil industry, one in West Texas and the other in Mississippi or Alabama.

Firman G. Hoyt, salesman for the past 6 years at the Los Angeles Branch of John A. Roebling's Sons Co., has been promoted to product sales manager of the Woven Wire Fabrics Division of the company at Trenton, N. J. He succeeds **W. K. Paff,** retiring after 50 years' service.

P. E. (Pete) Conner, veteran petroleum engineer, has been appointed sales engineer for Universal Packing & Gasket Co. of Houston, Tex. Conner has seen service as civil engineer with Humble Oil & Refining Co., 3 years as exploration engineer in South America for Standard Oil Co. (New Jersey), 7 years as geophysical supervisor for Pure Oil Co. He joined Reed Roller Bit Co. in 1936 to handle its Louisiana territory.

Stephen A. Brooks and seven associates have organized Brooks Rotameter Co., a corporation capitalized at $100,000. A factory with 18,000 sq. ft. of floor space has been acquired at Lansdale, Pa., and manufacture has been started upon all types of rotameters for flow-rate measurement control.

Lt. Comdr. George W. Stevens has returned to Superior Engine Division of The National Supply Co. after 3½ years with the Navy. He will be located at Fort Worth, Tex., and has been appointed regional manager, the same position he held prior to entering the service.

Sheffield Steel Corp. announces the appointment of **Alfred B. Egan** as manager sales, Reinforcing Products Division. He has been with Sheffield for 16 years. For a greater part of this time he was in charge of the Des Moines office.

Appointment of **Colin M. Stewart** as general manager of Compania Goodrich Cubana, S. A. Havana, Cuba, is announced by **Russell F. Moody,** vice president of the Cuban company. Compania Goodrich Cubana is associated with The B. F. Goodrich Co. in the manufacture of tires, tubes, and other rubber products in Cuba.

George O. Boomer, longtime associate of the late Walter H. Girdler, Sr., founder of Tube Turns, Inc., Louisville, Ky., was elected president of the firm at a recent meeting of the board of directors. He was vice president of Tube Turns when Girdler died suddenly last January. Boomer succeeds **Rudy E. Fritsch,** who resigned early in October. Fritsch will remain with Tube Turns as a consultant for the present.

Coppus Engineering Corp. has appointed Malcolm W. Black & Co., 41 East 42nd Street, New York, as district representatives.

Fisher Governor Co., Marshalltown, Iowa, announces the appointment of Puffer-Sweiven Co. as its exclusive representative in the Texas Gulf Coast area. The office address is Room 605, Merchants & Manufacturers Building, Houston 2, Tex. **Kenneth L. Puffer** has been associated with the Fisher company for more than 20 years, both as a member of the Marshalltown engineering and research staff and as a sales engineer in the field. **C. E. Sweiven** for the past 2 years has served the Fisher company in the home office as sales engineer.

C. E. SWEIVEN K. L. PUFFER

Expansion of the plant, facilities, and the trade territory of Midco Tool and Supply Co., of Oklahoma City, has been announced by **Randolph C. Walker,** president of Aireon Manufacturing Corp., Kansas City, which recently purchased the Midco company. At the same time Walker announced that **William F. Bonner,** general manager of Midco, and **Dr. C. P. Bondurant,** both of Oklahoma City, had been added to the board of directors. Other Midco directors are **Walker, B. D. Craig,** and **A. E. Welch,** all of Kansas City.

Stockholders of Kinner Motors, Inc., have voted to change the corporation's name to Gladden Products Corp. No change in executive or directional ranks were made. Present officers are **John N. Gladden,** president; **G. Brashears,** vice president; and **Murray Wilson,** secretary-treasurer. Directors, in addition to Gladden and Brashears include **T. E. Madere, Victor Ford Collins,** and **Harold J. Lane.**

The Foxboro Co., maker of industrial instruments for measurement and control, announces the appointment of **V. V. St. L. Tivy** as assistant manager, oil and gas industries sales division. **Nels A. Swanson** has joined the company as a sales engineer, attached to the branch office at 2307 E. 8th St., Los Angeles 21, Calif.

Acquisition of Security Engineering Co., Inc., of Whittier, Calif., by Dresser Industries, Inc., has been completed with the issuance of Dresser common stock to the holders of Security common stock, **H. N. Mallon,** Dresser president, has announced. The exchange was on the basis of one share of Dresser for one and three-fourth shares of Security.

Tube Turns, Inc., Louisville, Ky., has recently announced that the board of directors has approved the leasing from Reconstruction Finance Corp. of $3,000,000 worth of Defense Plant Corp. equipment, which had been installed for war work. At the same time, he said, the board also authorized the purchase of additional equipment costing $500,000, to round out the company's production facilities.

Guy Daniels, New York City, has been appointed export agent for Magnet Cove Barium Corp., and will handle the complete line of Magcobar weighting materials.

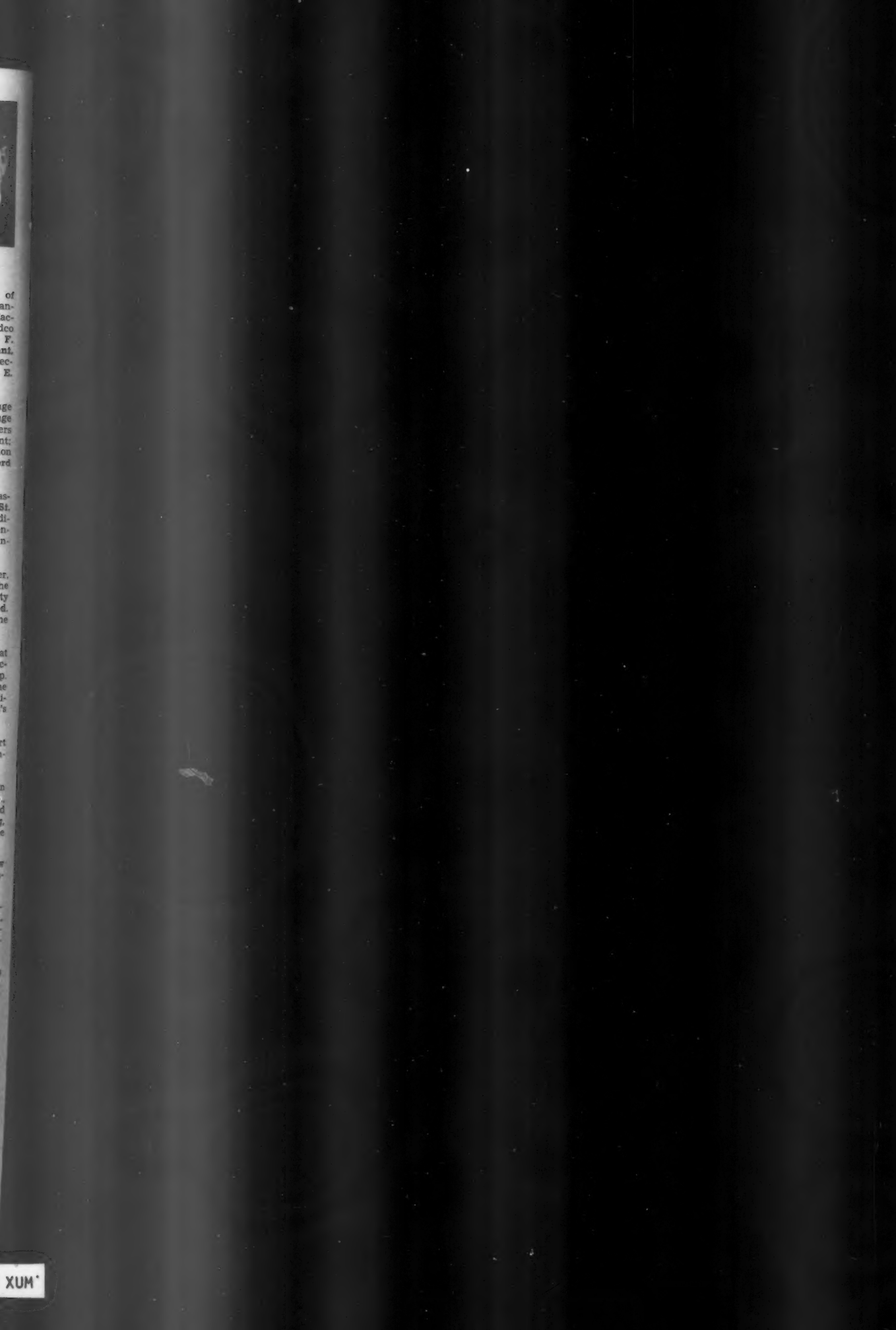
Appointment of **Charles W. Stewart** as vice president in charge of sales is announced by The Clark Manufacturing Co., Cleveland, Ohio, manufacturers of steam specialties and fluid controls. Stewart will work closely with **John L. Mainwaring,** vice president, in extending the sales and distribution of the company's products nationally.

Fred C. Abbott has been appointed manager of the new products division, Pennsylvania Salt Manufacturing Co., Philadelphia, Pa.

Hewitt Rubber Corp. has named **Adrian W. Smith** as manager of the Restfoam division, according to **Thomas Robins, Jr.,** Hewitt president. For the past 5 years Smith was executive assistant to **Burdette S. Wright,** vice president and general manager of Curtiss-Wright Corp.'s airplane division.

George N. LaMont, distributor of oil field supplies, has announced an office had been opened at 822 McBirney Building, Tulsa, with **C. Lewis Mims** as the subdistributor. LaMont's headquarters are in Houston.

Sperry-Sun Well Surveying Co. has recently acquired by outright purchase the building and property at 3118 Blodgett Avenue, Houston, Tex., on which its present Gulf Coast headquarters are located. The property comprises over 2 acres of land. **Roland Ring,** assistant to Sperry-Sun's vice president and general manager, **G. L. Kothny,** is in charge of the Houston office. Sperry-Sun is also establishing a new research and development department in the suburbs of Philadelphia where new equipment and new services will be developed and tested out.

John B. Tower, formerly in charge of export activities of the War Products Division of United States Rubber Co. in Washington, D. C., has been returned to United States Rubber Export Co. as assistant to the vice president with headquarters in New York.

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